5.8 FIELD EVALUATION OF THE EGR CONCEPT

Following development of the EGR prototype sampling system, field evaluations were performed under USEPA contracts (Williamson, et al., 1985). The Emission Gas Recycle System was used to measure total mass and particulate size fractions at three separate coal-fired power plants. The test series compared results from the EGR system with those from standard Method 17 mass train systems, conventional cyclone and impactor trains, and similar trains using another PM_{10} candidate method, SIM5 (Farthing, et al., 1985). During the first two tests, the EGR and conventional cyclone train consisted of Cyclones I and IV of the SoRI/EPA series cyclone train, followed by a 47mm glass fiber filter. For the final test of the series, a full SoRI five-stage series cyclone system was used for both systems. University of Washington Mark V impactors were also used for comparisons in all testing.

5.8.1 TEST NO. 1

The first field test took place at one of the twin 56 MW coal-fired boilers at a utility generating station. The plant nominally operates at minimum (half) load; however, boiler conditions occasionally changed as dictated by demand. The sampling location chosen was the ducting between an outdated, somewhat inefficient electrostatic precipitator and a retro-fitted, more efficient ESP.

The overall test was divided into two subtests. Subtest A involved the comparison of traverses performed with the EGR train and a standard Method 17 (M17) mass train. To eliminate spatial bias, a probe was configured with a cyclone set (SoRI Cyclone I, Cyclone IV and a 47mm filter) using an EGR nozzle and a collocated 47mm filter. The large diameter of this system required plant installation of six-inch ports. Three traverse points were selected which represented the maximum point-to-point velocity change accessible through the six-inch ports. The recycle rate was then adjusted to achieve isokinetic sampling at each point while maintaining the chosen the chosen constant flowrate through the cyclone set. The flowrate through the collocated 47 mm filter was adjusted at each point according to isokinetic sampling protocol.

In Subtest B, the EGR-M17 hardware described under Subtest A was used without modification. A second cyclone train, without emission gas recirculation, was used for a "near-collocated" reference. This train used identical cyclone samplers equipped with a standard nozzle rather than the EGR nozzle. The remainder of the sampling train was conventional: a heated stainless steel probe, ice bath condenser, and a commercial Method 5 control box. Both probes (three sampling trains) were inserted at right angles to each other in order to sample at the same point in the duct (within approximately four-inch nozzle-to-nozzle spacing). The duct point and nozzle for the nonrecycle train which were selected resulted in an isokinetic flowrate that was slightly greater than the flowrate calculated for a 10μm D_{50} in the cyclone. The isokinetic flowrate rather than the PM_{10} flow rate was used for sampling. The EGR cyclone was fitted with a smaller nozzle than the nonrecycle train. The EGR sample flowrate was adjusted to maintain isokinetic nozzle sampling. The recycle fraction was adjusted to make the cyclone flowrate identical to that used for the nonrecycle cyclone. The Method 17 sampler was operated in the usual fashion.

A total of eight valid EGR comparison tests were performed during the initial field test. Sampling runs 2 through 6 were completed as described under Subtest A. With the exception of Run 3, which was performed during aperiod of fluctuating boiler load, these were performed with the boiler at full load (56 MW). Runs 7 through 10 were replicates for Subtest B, all of which were run at minimum boiler conditions (28 MW).

The run parameters, along with the total mass and nominal-PM_{10} loadings are shown in Table 5-1. The recycle rates (shown as percentage of the total cyclone flowrate) varied from 9.6% to 59.6% during the test series.

5.8.2 TEST NO. 2

The second EGR field test was carried out at a 500 MW coal-fired power plant. The plant consisted of two 250 MW units with emission from each unit controlled by two cold-side electrostatic precipitators. The sampling location chosen was between the outlet of one ESP and the stack. Pretest surveys indicated the duct velocity averaged 60 ft/sec, with substantial velocity spread. An aerosol mass median diameter in the 7-14 μm diameter range was expected. As previously mentioned, the cyclone trains used for the second field test were identical to those used for the first test (SoRI Cyclone I, Cyclone IV, and a 47 mm quartz-fiber backup filter). The EGR cyclone train simultaneously sampled a three-point traverse along with a standard sampling cyclone train following another candidate PM_{10} sampling protocol referred to as SIM5 (Synthetic Method 5). The SIM5 protocol was developed to provide valid emissions data for 10μm and smaller particles while using a fixed sampling flowrate. The method is not capable of correctly measuring emissions of particles larger than 10μm, consequently no valid total emissions data can be obtained using it.

The flowrates through both trains were set to produce a 10 μm aerodynamic D_{50} through the first cyclone. The nonrecycle (SIM5) cyclone train sampled across the traverse at constant flowrate as outlined in the SIM5 protocol. By using a slightly smaller nozzle on the EGR system, the nozzle sampled isokinetically while the total cyclone flowrate was keep constant with the addition of variable amounts of recycle gas. Eight replicates of the paired measurements were initiated. However, equipment malfunctions invalidated the first two EGR runs, and the fifth EGR/SIM5 run was aborted after the boiler dropped from 240 MW to 90 MW due to plugging of a fuel feed line. The run parameters, total mass loadings, and PM_{10} mass loadings for these tests are shown in Table 5-2. As with the first field test, the samples were obtained within 10% of the isokinetic ratio. In this test series the recycle rates consistently averaged around 46%.

Table 5-1. EGR test 1 run parameters.

	Sample Flow (acfm)	Percent Recycle	Percent Isokinetic	Boiler Load (MW)	Mass Loading (mg/dnm³)	PM_{10} Loading (mg/dnm³)
Run 2						
M17	0.67	--	164.3	56	1557[a]	--
EGR	0.56	18.0	98.1		2053	453
Run 3						
M17	0.57	--	99.4	34	586	--
EGR	0.33	59.6	96.8		543	113
Run 4						
M17	0.40	--	96.1	56	2397	--
EGR	0.59	15.6	100.9		1952	391
Run 5						
M17	0.42	--	100.6	56	2077	--
EGR	0.62	15.7	107.5		1804	411
Run 6						
M17	0.48	--	107.7	56	1888	--
EGR	0.64	9.6	104.5		1808	399
Run 7						
M17	0.49	--	104.7	28	61.9	--
EGR	0.57	20.8	105.9		42.9	17.8
STD	0.66	--	89.7		46.5	18.5
Run 8						
M17	0.45	--	107.2		87.9	--
EGR	0.53	41.6	108.8	28	75.7	21.8
STD	0.67	--	102.7		57.2	21.8
Run 9						
M17	0.49	--	111.9		65.3	--
EGR	0.55	33.6	111.0	28	63.9	20.5
STD	0.74	--	107.9		67.0	28.8
Run 10						
M17	0.47	--	99.7		80.9	--
EGR	0.56	34.9	101.9	28	74.5	27.8
STD	0.74	--	100.6		60.4	26.6

[a]M17 control box malfunction--run deleted from test averages.

Table 5-2. EGR test 2 run parameters.

	Sample Flow (acfm)	Percent Recycle	Percent Isokinetic	Mass Loading (mg/dnm^3)	PM_{10} Loading (mg/dnm^3)
Run 1					
EGR	0.40	38.9	111.7	--[a]	110
SIM5	0.60	--	95.1	264	124
Run 2					
EGR	0.33	47.7	98.4	--[b]	--
SIM5	0.61	--	94.0	213	109
Run 3					
EGR	0.34	46.5	96.5	195	94
SIM5	0.62	--	97.3	201	107
Run 4					
EGR	0.35	46.3	99.7	279	130
SIM5	0.59	--	92.4	307	138
Run 6					
EGR	0.34	48.6	99.1	115	56
SIM5	0.61	--	100.2	130	66
Run 7					
EGR	0.34	47.5	99.6	200	86
SIM5	0.60	--	94.4	207	104
Run 8					
EGR	0.36	45.3	97.1	189	79
SIM5	0.60	--	91.7	228	104

[a]Excessive nozzle scrape -- total mass not included in test averages.

[b]Invalidated run -- deleted from test averages.

5.8.3 TEST NO. 3

The site chosen for the third EGR field test was a 221 MW coal-fired utility boiler. Sampling took place at the inlets to two identical particulate control devices. Eight four-inch ports provided access to the duct interior on each unit. The velocity of Duct A ranged from 37 to 64 ft/sec, with a mean velocity of approximately 51 ft/sec. Duct B had a velocity range of 45 to 61 ft/sec, with an average of 53 ft/sec.

The test plan called for a concurrent EGR/nonrecycle (SIM5) test series similar to that of Test No. 2. The flowrate for each train was chosen such that the aerodynamic D_{50} for the first cyclone was 10 µm. Across the traverse, the EGR nozzle sampled isokinetically while a constant cyclone flow rate was maintained using a variable fraction of recycle gas. The nonrecycle cyclone train once again sampled according to SIM5 protocol. In this test, full duct (12-point) PM_{10} measurements were performed rather than the three-point sample in Test 2. Each 12-point traverse involved sampling at three points in four of the eight ports. The eight ports available for sampling on each duct were grouped into two sets of four, ACEG and BDFH. Four sets of simultaneous EGR and nonrecycle (SIM5) runs were performed at the inlet to Unit A. Two traverses were performed in ports ACEG and two in ports BDFH. Two replicates were performed in Duct B using ports ACEG. The sampling hardware used for both the EGR and nonrecycle (SIM5) trains throughout this testing consisted of full SoRI Five-Stage Series Cyclone sets. The run parameters and loadings for the paired cyclone runs are shown in Table 5-3. The recycle rate averaged about 48% with little variation from run to run.

5.8.4 RESULTS AND CONCLUSIONS FROM COLLABORATIVE TESTS

Average particulate concentrations and 95% confidence limits from the data obtained in the three test series are summarized in Table 5-4. As can be seen, the tests covered a broad range of particulate concentrations. At every site, the EGR train and the comparison device measured particulate concentrations which agreed within the combined confidence limits of the measurements. Table 5-4 also presents the relative standard deviation (standard deviation expressed as a percentage of the mean value) of each set of runs. In two cases the relative standard deviation of the EGR is over 15% (Site 1 at low load and Site 2). At Site 2 the same degree of variation is seen in measurements with comparison devices. Since the testing coincided with a period of coal pulverizer problems, the variability is easily attributable to source instability. Some indication of source variability was also noted at Site 1 at low load, although the variance of the EGR data is greater than that seen by the other techniques. It is also interesting to note that the precision of the PM_{10} measurements is better in every case than that of total mass measurements with the same device.

The test plan for all three sites included simultaneous measurements (collocated where possible) with the EGR train and suitable comparison devices in order to minimize the effects of source temporal variability.

Table 5-3. EGR test 3 run parameters.

	Sample Flow (acfm)	Percent Recycle	Percent Isokinetic	Sampling Duct	Mass Loading (mg/dnm^3)	PM_{10} Loading (mg/dnm^3)
Run 1						
EGR	0.30	48.4	101.3	A	3630	744
SIM5	0.60	--	97.2	A	4090	776
Run 2						
EGR	0.31	47.9	100.8	A	3570	791
SIM5	0.58	--	99.4	A	2920	659
Run 3						
EGR	0.32	44.0	98.9	A	2740	749
SIM5	0.51	--	105.1	A	3750	650
Run 4						
EGR	0.30	48.4	101.6	A	3810	752
SIM5	0.57	--	98.5	A	3830	660
Run 5						
EGR	0.31	49.1	99.4	B	3830	814
SIM5	0.56	--	120.8	B	3270	756
Run 6						
EGR	0.31	52.2	101.1	B	4330	969
SIM5	0.57	--	105.9	B	3680	794

Table 5-4. Average particulate concentrations observed in EGR test series

	No. of Runs	Total Mass Average Loading (mg/dnm^3)	Total Mass Relative Standard Deviation (%)	PM_{10} Average Loading (mg/dnm^3)	PM_{10} Relative Standard Deviation (%)
Site 1					
High boiler load					
M17 mass train	3	2120 (±638)[a]	12.1	--	--
EGR cyclone train	4	1904 (±192)	6.3	413 (±44)	6.7
Low boiler load					
M17 mass train	4	74 (±20)	16.8	--	--
EGR cyclone train	4	65 (±24)	23.4	22 (±6.7)	19.1
Std. cyclone train	4	57 (±12)	13.2	23 (±7.5)	19.7
Site 2					
EGR cyclone train	6	196 (±72)	29.7	92 (±26)	7.1
SIM5 cyclone train	7	221 (±51)	24.9	107 (±23)	6.4
Site 3					
EGR cyclone train	6	3650 (±546)	14.3	803 (±90)	10.7
SIM5 cyclone train	6	3590 (±444)	11.8	716 (±70)	9.3

[a] 95% confidence intervals are indicated for each mean particulate loading.

Table 5-5 contains a paired run analysis of the test data. The entries in Table 5-5 represent means and 95 percent confidence limits of individual run percentage differences for the paired measurements of total particulate mass or PM_{10} concentration. The percentage differences between the EGR and SIM5 values are relative to the mean of the two concentrations. No consistent trend is seen between the EGR and comparison measurements, and the differences typically do not exceed the 95% significance level.

In summary, the EGR train continues to be a promising technique for source particulate measurements. Further development of the technique should include correction of the few design deficiencies discovered during these tests, adaptation of the EGR concept to a cascade impactor for more detailed size distribution measurements, and further field validation of the concept. It is believed that the method has excellent potential to satisfy the requirements of a PM_{10} reference method.

Table 5-5. Percentage difference between EGR cyclone train and reference device in paired runs.

	Number of Runs	Total Mass	PM_{10}
Site 1 (Method 17)	8	-11.5±8.3	--
Site 1 (Nonrecycle cyclone)	4	9.0±28.7	-8.3±27.4
Site 2 (SIM5 cyclone)	5	-9.3±8.4	-15±6.5
Site 3 (SIM5 cyclone)	6	1.6±20.0	11.4±9.7

[a] Quoted values represent the mean and 95 percent confidence limits of the difference between the EGR concentration and the comparison device concentration on individual runs, expressed as a percentage of the overall mean reference concentration.

SECTION 6

FIELD DEMONSTRATION

A field demonstration of the hardware and techniques described in the three protocols was carried out in Sacramento during the week of January 13, 1986. The demonstrations included actual field sampling and explanations of the equipment and techniques in the laboratory.

The number of samples and the extent to which the protocols could be followed in detail were limited by problems in locating a suitable source, and, once a source was decided upon, by problems in the source operation.

Initially, the source to be used for the field demonstration was a petroleum coke fired boiler operated by the Avon Refinery which was located near Concord, CA. The sampling equipment and personnel arrived at that site on the morning of Monday, 1/13 and equipment setup was begun. However, before setup was complete, the sampling ports were found to be restricted in their internal diameters so that the samplers for two of the three methods could not be inserted into the duct. Both the PM_{10} (EGR) and Five-Stage Cyclone samplers are designed to work through four inch pipe size or larger ports, but four inch ports must be completely unobstructed. The impactors can be inserted through somewhat smaller ports. The sampling ports at the Avon site were four inch pipe nipples, but they contained 1/8 to 3/16 inch weld beads around their inner circumferences and had been mounted off center on four inch holes cut into the ducting. The weld beads and the lips which resulted from the off center mounting of the nipples made insertion of the PM_{10} and cyclone samplers impossible. Therefore, the equipment and personnel returned to Sacramento while an alternate site was sought.

On Tuesday, 1/14 a pilot plant gasifier was selected as the field site. The gasifier is operated as a research unit by the State of California at its central steam plant in Sacramento. The material to be gasified is typically wood slash and/or municipal refuse. Emission testing was already underway on the gasifier for other purposes at this time and the methods demonstrations had to be carried out in a way that would not interfere with those tests. The availability of the gasifier for testing was limited by the amount of fuel which was on hand. Sufficient fuel was on hand for only two to three hours of operation, consequently the sampling associated with the methods demonstrations had to take place concurrent with the ongoing emissions tests.

Equipment setup for sampling at the gasifier stack was begun early on 1/14 in preparation for testing on 1/14 and 1/15. Unfortunately, a fan bearing failed on the gasifier, and the day was lost for sampling while repairs were made. Thursday, 1/16 had been reserved for laboratory demonstrations which could not be rescheduled because of conflicts with other activities of the attending personnel. Thus the field sampling was finally limited by fuel availability and other circumstances to two periods of about one hour each on the morning of Wednesday 1/15.

A total of four six-inch ports had been installed on the stack, of which two were free for the demonstration. The four ports were installed in single plane, making simultaneous traverses through all four impossible. Because of the limited fuel, all sampling for the emission tests and the methods demonstrations had to take place concurrently. The ongoing emissions testing program had priority; therefore the three demonstration systems had to sample through only two ports and do so in a way that would not interfere with the traverses which were being made through the other two. As a consequence, the demonstration runs were made as single point samples in one quadrant of the stack rather than as full traverses as specified by the protocols.

Sampling took place during the first period of gasifier operation with all three of the methods. The two one-hour periods of gasifier operation were separated by too short a period of time to permit the PM_{10} sampler to be cleaned up and readied for another run so only one sample was obtained with it. A single run which spanned both periods of gasifier operation was made with the Five-stage Cyclone sampler. The latter is intended to collect material for chemical analysis and a single large sample is more useful for that purpose than two smaller samples. In any case, there would not have been enough time to recover a sample and prepare for a second run in the interval between the two test burns. Two impactor runs were made, one during each period of gasifier operation.

The impactor from the first run was opened and inspected on site at the steam plant shortly after the run was completed to check on stage loadings. These were thought to be too high on the basis of visual inspection and the second run was shortened to one third of the sampling duration used in the first. Even with the reduced sampling time, the catches on three of the stages from the second run were larger than the limits called for in the protocol but they were probably not so large as to invalidate the results.

The collected particulate matter was left in the samplers overnight so that they could be used in the laboratory demonstrations on the 16th. They were then unloaded as part of the lab demonstration. The cyclone samples were recovered by washdowns using methylene chloride as called for by the protocol and preserved for possible chemical analyses so no results can be reported from that run. The demonstration was not to include actual analyses but the samples were saved for possible analysis at a later time at the discretion of the ARB. Results are included here for the two impactor runs and the PM_{10} run. The total concentrations from those three runs were calculated to be 730, 938, and 863 mg/dnm3 for the first and second impactor runs and the PM_{10} run respectively. The concentrations for particles smaller than 10μm were respectively 568, 797, and 820 mg/dnm3.

Because of the severe overloading in the first impactor run, the results from it should be discounted insofar as the size distribution is concerned. The concentration of particles smaller than 10μm from the PM_{10} sampler is valid (subject to the uncertainty resulting from its being from a single point sample). However, some part of the cyclone catch (particles larger than 10μm) from that run was lost while showing the sample and sampler during the lab demonstration. Therefore the total concentration from the PM_{10} sample is low by an unknown amount.

The mass median diameter of the emissions as measured in the second impactor run was 2.5μm on an aerodynamic diameter basis and the distribution was approximately log-normal with a sigma-g of about 4. The data suggest that the distribution was really trimodal with the bulk of the emissions in a mode centered at about 2.5μm. The remainder of the emissions would then fall in two lower concentration modes; one centered near 25μm and one near 0.3μm. However, with only one run, and that possibly flawed by overloading, the reality of the latter modes is open to question. Printouts from the PM_{10} (EGR) and impactor data reduction programs are given in Figures 6-1, 6-2, and 6-3. These include both the raw data and the final results. Plots of the size distribution results from the second impactor run are given in Figures 6-4 through 6-6.

EXHAUST GAS RECIRCULATION
DATA REDUCTION
VERSION 3.3 FEBRUARY 1986

TEST ID. CODE: CARB EGR1
TEST LOCATION: GASSIFIER OUTLET
TEST SITE: SACRAMENTO/CALIFORNIA
TEST DATE: 1-15-86
OPERATOR(S): RSMartin

***** ENTERED RUN DATA *****

TEMPERATURES
T(STK): 310.1 F
T(RCL): 323.4 F
T(LFE): 60.9 F
T(DGM): 56.6 F

SYSTEM PRESSURES
DH(ORI): 1.14 INWG
DP(TOT): 1.69 INWG
P(INL) : 5.23 INWG
DP(RCL): 1.69 INWG
DP(PTO): 0.30 INWG

MISCELLANEA
P(BAR) : 30.02 INHG
DP(STK): 0.00 INWG
V(DGM) : 10.007 FT3
TIME : 42.00 MIN
% CO2 : 12.10
% O2 : 6.30
NOZ (IN): 0.1853

WATER CONTENT
ESTIMATE : 16.9 %
OR
CONDENSER: 0.0 ML
COLUMN : 0.0 GM

RAW MASSES
CYCLONE 1: 12.5 MG
FILTER : 237.4 MG

IMPINGER
RESIDUE : 0.0 MG

BLANK VALUES
CYC RINSE : 0.0 MG
FILTER HOLDER
RINSE : 0.0 MG
FILTER BLANK : 0.0 MG
IMPINGER
RINSE : 0.0 MG

CALIBRATION VALUES
CP(PITOT) : 0.830
DH@(ORI) : 10.980
M(TOT LFE): 0.2298
B(TOT LFE): -.0058
M(RCL LFE): 0.0948
B(RCL LFE): -.0007
DGM GAMMA : 0.9940

****** REDUCED DATA ******

STACK VELOCITY (FT/SEC)	37.11
STACK GAS MOISTURE (%)	16.9
SAMPLE FLOWRATE (ACFM)	0.4263
TOTAL FLOWRATE (ACFM)	0.6687
RECYCLE FLOWRATE (ACFM)	0.2501
PERCENT RECYCLE	36.2
ISOKINETIC RATIO (%)	102.2

	(UM)	(% <) (PARTICULATE)	(MG/DNCM)	(GR/ACF)	(GR/DCF)	(LB/DSCF) (X 1E6)
CYCLONE 1	9.44	95.0	43.2	0.01075	0.01882	2.69457
BACKUP FILTER	---	---	819.6	0.20420	0.35742	51.175
PARTICULATE TOTAL	---	---	862.8	0.21495	0.37623	53.870

Figure 6-1. Data and results from the PM10 sampling run during the ARB demonstration.

```
*******************IMPACTOR VERSION 4.1*******************

************* INPUT DATA ***********

 1)PART. DIAMETER     CLASSICAL AERODYNAMIC
 2)DATE OF TEST: 1/15/86
 3)TIME OF TEST: 0740
 4)LOCATION OF TEST: GASSIFIER STACK
 5)TEST NUMBER     0
 6)TEST TYPE            OUTLET
 7)RUN NUMBER: CARB1-FILE NAME:T0RCARB1.OT
 8)RUN REMARKS: OVERLOADED
10)IMPACTOR TYPE: CARB HIFLO
PC-3-4-5-7-9-11

 9)WATER VAPOR          16.90% (KEYBOARD)
   CO2 12.10%           CO   1.00%
   O2    6.30%          N2 80.60%
12). ORIFICE ID (OPTIONAL): .130 NOT IN FILE
13)  SUBSTRATE MATERIAL: AP. H ON SS


 1)GAS METER VOL      8.868 CUBIC FEET
 2)IMPACTOR DELTA P     .00 IN. HG.
 3)ORIFICE DELTA P      .00 INCHES H2O
 4)STACK PRESSURE       .00 INCHES H2O
 5)BAROMETRIC PRES    30.02 INCHES HG
 6)STACK TEMP        323    DEGREES F
 7)METER TEMP         53    DEGREES F
 8)IMPACTOR TEMP     323    DEGREES F
 9)SAMPLE TIME        20.00 MINUTES
10)AVG GAS VEL        36.14 FEET/SEC
11)ORIFICE PRES         .00 INCHES HG
12)NOZZLE DIA           .250 INCHES
13)MAX PART DIA      100.0  MICRONS
14)WATER VOLUME         .0  CC
15)METER FACTOR       1.0148


 MASS GAIN OF STAGE 1   41.15 MG
 MASS GAIN OF STAGE 2   30.06 MG
 MASS GAIN OF STAGE 3   34.77 MG
 MASS GAIN OF STAGE 4   30.00 MG
 MASS GAIN OF STAGE 5   20.23 MG
 MASS GAIN OF STAGE 6   13.35 MG
 MASS GAIN OF STAGE 7   11.32 MG
 MASS GAIN OF FILTER    12.79 MG

MASS GAIN OF BLANK SUBSTRATE      .21
MASS GAIN OF BLANK FILTER         .14
```

Figure 6-2a. Data from the first impactor run made during the ARB demonstration.

```
*********        RESULTS      **********

TEST NUMBER: 0   RUN NUMBER: CARB1

ACTUAL FLOW RATE             .826 CFM
FLOW RATE AT STANDARD CONDITIONS      .465 CFM
PERCENT ISOKINETIC         111.810 %
VISCOSITY              219.8E-06GM/CM SEC
CALCULATED IMPACTOR DELTA P =  5.48 IN. HG
```

STAGE	CUNN. CORR.	DP (CLAS AERO)	DP (IMP AERO)	CUM FREQ.	RE. NO.	V*D50 UM-M/S
1	1.025	9.576	9.694	78.684	1410	29.5
2	1.061	3.912	4.029	63.142	612	27.2
3	1.116	2.060	2.176	45.147	252	18.2
4	1.201	1.191	1.305	29.637	320	20.9
5	1.397	.614	.726	19.213	475	23.7
6	1.767	.338	.450	12.371	650	23.6
7	2.461	.196	.307	6.5865	1219	26.5

STAGE CUT DIAMETERS BASED ON THEORETICAL VALUES OF STAGE CONSTANTS

TOTAL MASS CONCENTRATION = 7.30E+02 MG/DRY NORMAL CUBIC METER

SPLINE FIT ON CLASSICAL AERODYNAMIC DIAMETER BASIS

PARTICLE DIA. (MICRONS)	CUMFR (STDDEV)	CUMFR (PERCENT)	CUM.MASS (MG/DRY N.CU.METER)	DM/DLOGD
.100	- 2.0431	2.05	1.50E+01	6.62E+01
.159	- 1.6761	4.69	3.42E+01	1.31E+02
.251	- 1.3401	9.01	6.57E+01	1.79E+02
.398	- 1.0697	14.24	1.04E+02	1.91E+02
.631	- .8583	19.54	1.43E+02	2.03E+02
1.000	- .6389	26.15	1.91E+02	3.01E+02
1.585	- .3281	37.14	2.71E+02	4.92E+02
2.512	.0303	51.21	3.74E+02	5.00E+02
3.981	.3459	63.53	4.64E+02	3.87E+02
6.310	.5982	72.51	5.29E+02	2.78E+02
10.000	.8038	78.93	5.76E+02	9.58E+01
15.850	.9069	81.78	5.97E+02	1.23E+02
25.120	1.1011	86.46	6.31E+02	2.34E+02
39.810	1.6361	94.91	6.92E+02	3.49E+02
63.100	3.7630	99.99	7.30E+02	5.62E+00
100.00	1000000	100.00	7.30E+02	0.00E+00
158.50	1000000	100.00	7.30E+02	0.00E+00
251.20	1000000	100.00	7.30E+02	0.00E+00
398.10	1000000	100.00	7.30E+02	0.00E+00
631.00	1000000	100.00	7.30E+02	0.00E+00

```
***  INHALABLE PARTICULATE MATTER ***

CUM MASS LESS THAN  1.000 MICRON: 190.76 MG/DNM3 ( 26.15 %)
CUM MASS LESS THAN  2.512 MICRON: 373.65 MG/DNM3 ( 51.21 %)
CUM MASS LESS THAN 10.000 MICRON: 575.86 MG/DNM3 ( 78.93 %)
CUM MASS LESS THAN 15.850 MICRON: 596.68 MG/DNM3 ( 81.78 %)
NOTE: DIAMETERS FOR INHALABLE PARTICULATE MATTER ARE
ON CLASSICAL AERODYNAMIC BASIS.
```

Figure 6-2b. Results of the first impactor run made during the ARB demonstration.

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*********************IMPACTOR VERSION 4.1********************

************* INPUT DATA ***********

 1)PART. DIAMETER    CLASSICAL AERODYNAMIC
 2)DATE OF TEST: 1/15/86
 3)TIME OF TEST: 0948
 4)LOCATION OF TEST: GASSIFIER STACK
 5)TEST NUMBER    0
 6)TEST TYPE         OUTLET
 7)RUN NUMBER: CARB2-FILE NAME:T0RCARB2.OT
 8)RUN REMARKS: SHORT RUN
10)IMPACTOR TYPE: CARB HIFLO
PC-3-4-5-7-9-11

 9)WATER VAPOR          16.40% (KEYBOARD)
   CO2 12.10%          CO   1.00%
   O2   6.30%          N2 80.60%
12)  ORIFICE ID (OPTIONAL): .130 NOT IN FILE
13)  SUBSTRATE MATERIAL: AP. H ON SS


 1)GAS METER VOL      3.036 CUBIC FEET
 2)IMPACTOR DELTA P    .00 IN. HG.
 3)ORIFICE DELTA P     .00 INCHES H2O
 4)STACK PRESSURE      .00 INCHES H2O
 5)BAROMETRIC PRES   30.02 INCHES HG
 6)STACK TEMP       310     DEGREES F
 7)METER TEMP        55     DEGREES F
 8)IMPACTOR TEMP    310     DEGREES F
 9)SAMPLE TIME        7.00 MINUTES
10)AVG GAS VEL       36.14 FEET/SEC
11)ORIFICE PRES        .00 INCHES HG
12)NOZZLE DIA         .250 INCHES
13)MAX PART DIA     100.0  MICRONS
14)WATER VOLUME        .0  CC
15)METER FACTOR      1.0148


 MASS GAIN OF STAGE 1  12.90 MG
 MASS GAIN OF STAGE 2  16.92 MG
 MASS GAIN OF STAGE 3  19.15 MG
 MASS GAIN OF STAGE 4  15.71 MG
 MASS GAIN OF STAGE 5   7.76 MG
 MASS GAIN OF STAGE 6   5.17 MG
 MASS GAIN OF STAGE 7   5.01 MG
 MASS GAIN OF FILTER    3.60 MG

MASS GAIN OF BLANK SUBSTRATE      .26
MASS GAIN OF BLANK FILTER         .18
```

Figure 6-3a. Data from the second impactor run made during the ARB demonstration.

********* RESULTS **********

TEST NUMBER: 0 RUN NUMBER: CARB2

ACTUAL FLOW RATE .787 CFM
FLOW RATE AT STANDARD CONDITIONS .453 CFM
PERCENT ISOKINETIC 106.493 %
VISCOSITY 217.2E-06GM/CM SEC
CALCULATED IMPACTOR DELTA P = 5.02 IN. HG

STAGE	CUNN. CORR.	DP (CLAS AERO)	DP (IMP AERO)	CUM FREQ.	RE. NO.	V*D50 UM-M/S
1	1.024	9.760	9.876	84.992	1384	28.6
2	1.059	3.990	4.105	65.210	601	26.5
3	1.111	2.107	2.221	42.781	247	17.8
4	1.191	1.222	1.334	24.436	315	20.4
5	1.377	.633	.742	15.531	466	23.2
6	1.720	.350	.459	9.7008	638	23.2
7	2.354	.205	.314	4.0608	1197	26.3

STAGE CUT DIAMETERS BASED ON THEORETICAL VALUES OF STAGE CONSTANTS

TOTAL MASS CONCENTRATION = 9.38E+02 MG/DRY NORMAL CUBIC METER

SPLINE FIT ON CLASSICAL AERODYNAMIC DIAMETER BASIS

PARTICLE DIA. (MICRONS)	CUMFR (STDDEV)	CUMFR (PERCENT)	CUM.MASS (MG/DRY N.CU.METER)	DM/DLOGD
.100	- 2.5728	.51	4.74E+00	3.65E+01
.159	- 2.0394	2.07	1.94E+01	1.25E+02
.251	- 1.5598	5.94	5.57E+01	2.23E+02
.398	- 1.2201	11.12	1.04E+02	2.31E+02
.631	- 1.0149	15.51	1.45E+02	1.94E+02
1.000	- .8196	20.62	1.93E+02	3.34E+02
1.585	- .4655	32.08	3.01E+02	7.46E+02
2.512	- .0123	49.51	4.64E+02	8.08E+02
3.981	.3887	65.12	6.11E+02	6.44E+02
6.310	.7351	76.89	7.21E+02	4.67E+02
10.000	1.0476	85.26	8.00E+02	2.35E+02
15.850	1.2766	89.91	8.44E+02	2.09E+02
25.120	1.5947	94.46	8.86E+02	2.19E+02
39.810	2.2519	98.78	9.27E+02	1.53E+02
63.100	4.4991	100.00	9.38E+02	3.55E-01
100.00	1000000	100.00	9.38E+02	0.00E+00
158.50	1000000	100.00	9.38E+02	0.00E+00
251.20	1000000	100.00	9.38E+02	0.00E+00
398.10	1000000	100.00	9.38E+02	0.00E+00
631.00	1000000	100.00	9.38E+02	0.00E+00

*** INHALABLE PARTICULATE MATTER ***

CUM MASS LESS THAN 1.000 MICRON: 193.49 MG/DNM3 (20.62 %)
CUM MASS LESS THAN 2.512 MICRON: 464.48 MG/DNM3 (49.51 %)
CUM MASS LESS THAN 10.000 MICRON: 799.89 MG/DNM3 (85.26 %)
CUM MASS LESS THAN 15.850 MICRON: 843.56 MG/DNM3 (89.91 %)
NOTE: DIAMETERS FOR INHALABLE PARTICULATE MATTER ARE
ON CLASSICAL AERODYNAMIC BASIS.

Figure 6-3b. Results of the second impactor run made during the ARB demonstration.

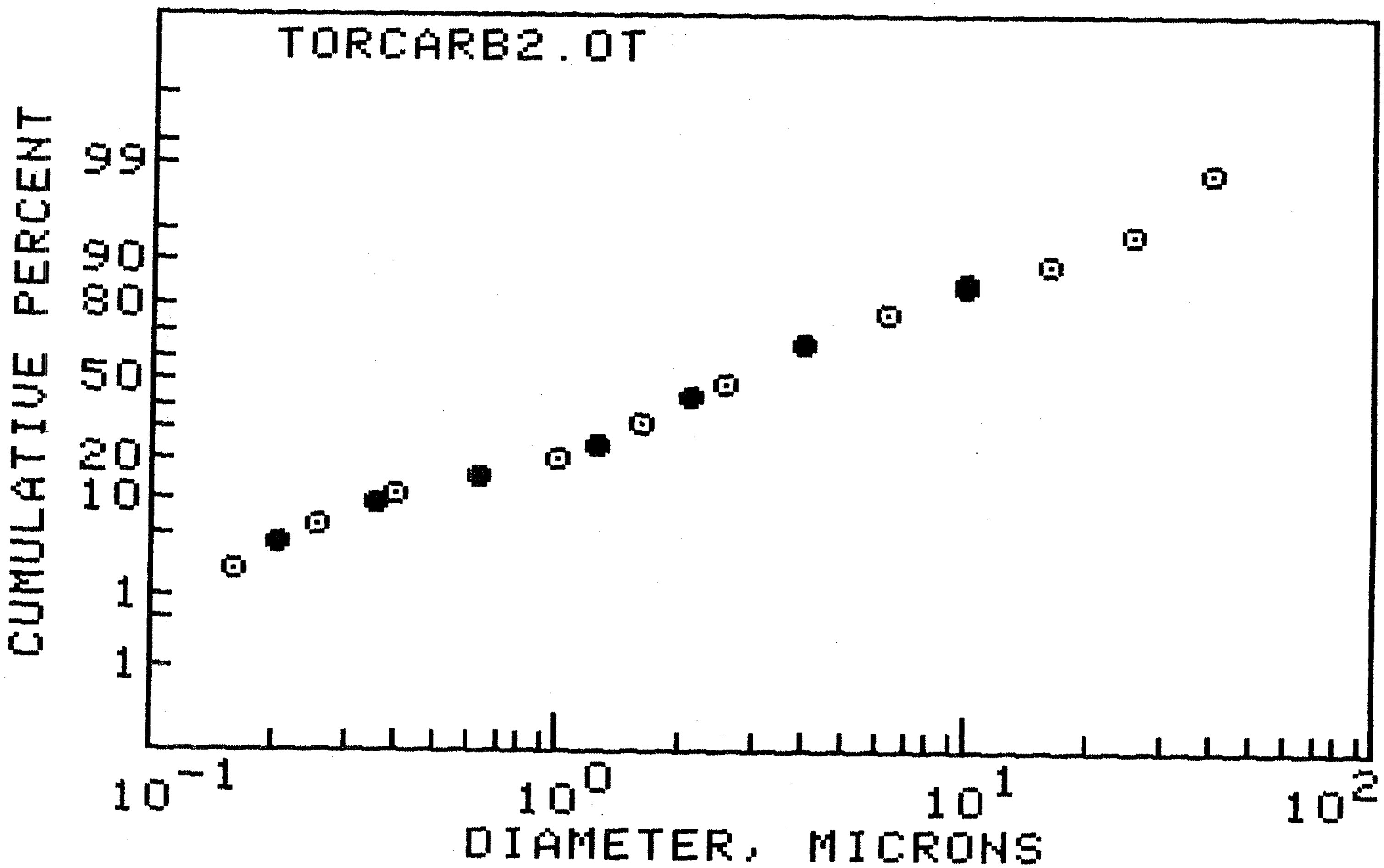

Figure 6-4. Particle size distribution results on a cumulative percentage basis as obtained from the second impactor run of the demonstration testing.

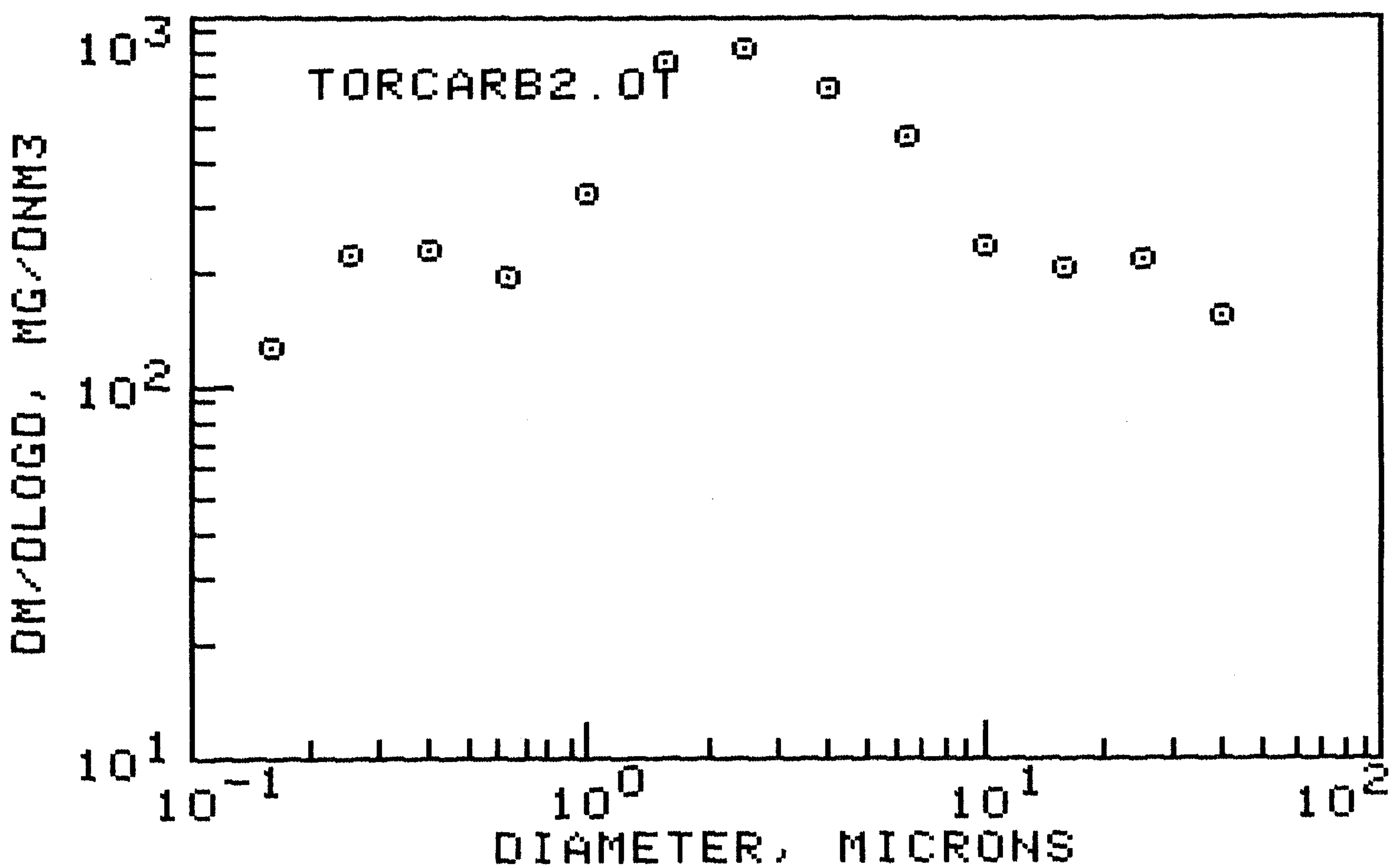

Figure 6-5. Particle size distribution results on a differential mass concentration basis as obtained from the second impactor run of the demonstration testing.

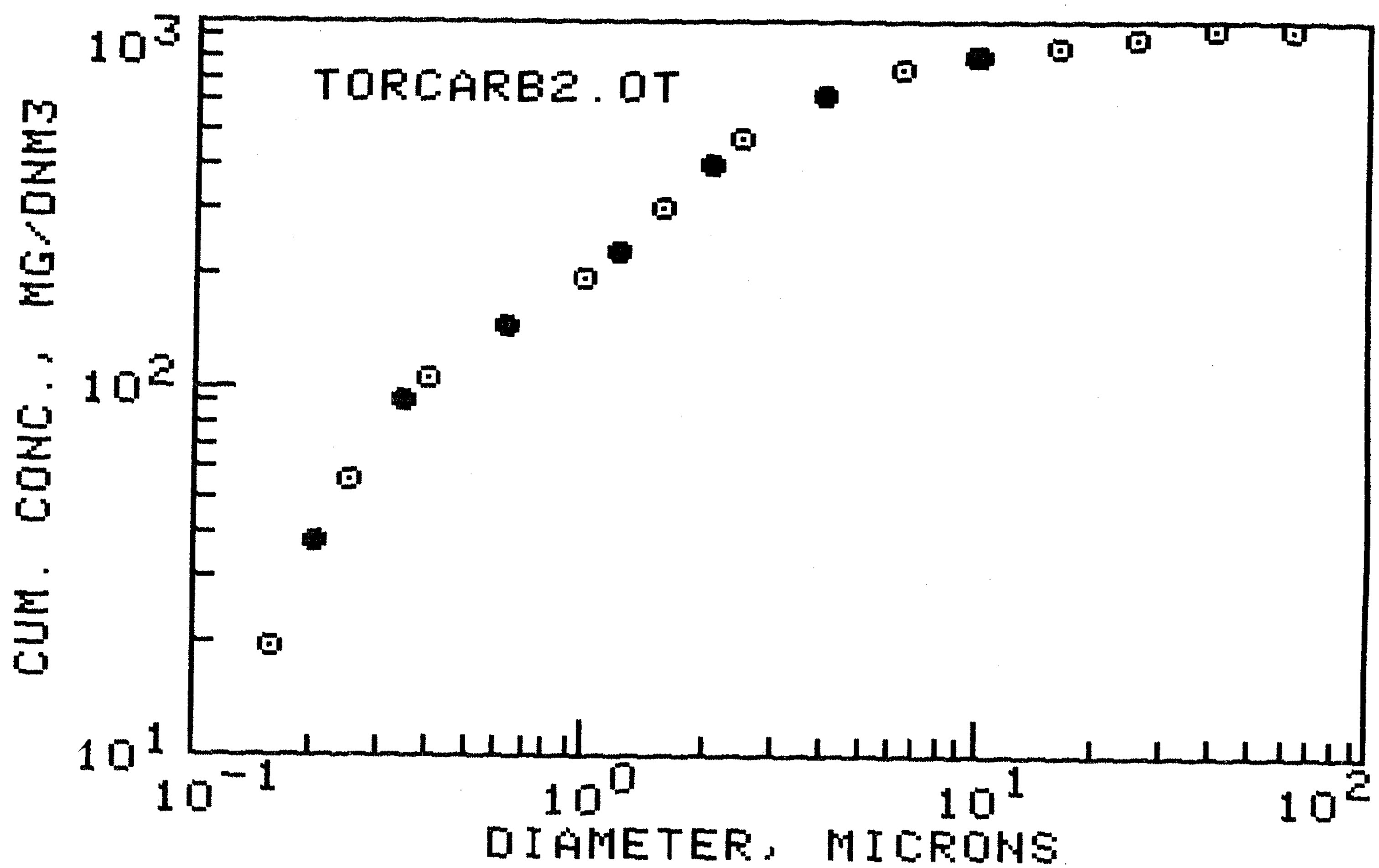

Figure 6-6. Particle size distribution results on a cumulative mass concentration basis from the second impactor run of the demonstration testing.

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APPENDIX

This Appendix provides a summary of the information gathered in the literature survey described in Section 2 of the report. The presentation format we have used was chosen because it facilitates comparison between the various instruments. The first table defines abbreviations used in the remaining tables and the second gives address information for the different manufacturers. Table A-3 presents equipment arranged alphabetically by manufacturer, while Table A-4 is sorted by "instrument type" code (sampling method). All the information given in Table A-3 is also contained in Table A-4 but is sorted differently. The last two tables are also sorted by sampling method and provide additional information on each of the instruments. For clarity, each instrument has been given a unique "Key Number" which appears in the first column of each table. Paragraphs in Section 2 of the report discuss the various sampling and measurement methods used in the tables.

Each instrument has been identified by a code (use code) which indicates how it may be used to characterize an industrial source. These six usage codes are as follows: FG:I for Flue Gas: In-situ operation; FG:E for Flue Gas: Extractive Techniques; AAA for Ambient Airborne Aerosol monitor, used in conjunction with a sample extraction/dilution system (DIL); L:AR for off-line (laboratory only) techniques involving airborne redispersion of the particulate from a bulk sample; L:LS for off-line techniques involving suspension of the particulate in a nonsoluble liquid; and L:Oth for off-line techniques other than those covered by airborne redispersion or suspension in a liquid. An additional code MA, is used to identify "Major Accessory" items used in conjunction with a given sizing method. The use code of most significance to the reader will probably be "FG:I" (Flue Gas: In-situ). The other codes identify instrumentation which can provide some information but are generally inadequate by themselves to characterize a source. The pricing information listed herein is for general information only. The exact price is set by the vendor and depends on the options selected. The pricing information shown was obtained by telephone in April 1985. The information is presented in the following six tables:

Comments

Use Codes (Measurement Environment for the Instrument):

FG:I	Flue Gas: Insitu operation
FG:E	Flue Gas: Extractive Techniques used
AAA	Ambient Airborn Aerosol monitor (useful with Dilution)
L:AR	Laboratory only: Airborn Redispersion from Bulk Powder
L:LS	Laboratory Only: Liquid Suspension of the particulate
L:Oth	Laboratory Only: Other technique, Image Analysis,etc.
MA	Major Accesory to a Primary Sizing Inst.(Data An.,etc)

Inst. Type: Codes Used:

AT	Aerodynamic Transport (Laser Doppler Velocity technique for sizing)
AV	Alternate Vender; see primary vender for data specifics.
CET	Centrifugal Seperation (Bahco and Spiral Centrifuge)
CNC	Condensation Nucli Counter (No sizing, conc. only)
CSED	Centrifugal Sedimentation
CYC	Cyclone sizing systems (centrifugal seperation)
DB	Diffusion Battery, screen, tube,plate,etc. (needs a second inst. to measure concentration)
EM	Eletrical Mobility (segrates by size but needs a second inst. to measure concentration-CNC, electrometer, etc.)
GSED	Gravitational Sedimentation
I:A	Impactor accesories (Percollectors, etc.)
I:CI	Inertial Seperation - Cascade Impactor (normal and low pressure)
IAN	Image Analysis System (from photo micrograph or Video of SEM or TEM w/wo EDX for elemental chemistry by size
MA	Major accesory to the sizing instrument, data reduction-pulse heighth analysis, etc.
MT17	Method 17 Mass Train (no oven, in-situ), for use in running Impactors or Cyclones
Misc	Miscellaneous sizing techniques not included by the other Misc codes
O:A	(OPC) Optical Particle Counter, for Aerosols (airborn), time averaged light scattering, scattered intensity
O:FD	Optical: Fraunhofer Diffraction pattern analysis, light scattering, spatical distribution
O:L	(OPC) Optical Particle Counter, for liquid suspensions, time averaged light scattering, scattered intensity
O:LB	Optical: Light blockage
O:PC	Optical: Photon Correlation Spectroscopy (time dependent light scattering based on Brownian Motion)
PHA	Pulse Heighth Analysis Inst. MCA's,DAS (Data Aquisition Systems-printed,magnetic tape, BCD for Micros,etc.)
RP	Resistivity Pulse (Electrical sensing zone, Coulter

Comments

Principle

SIV Screen Sieving (manual and automated)
ZZZ Manufacturer's Name, code used to sort Mfg. to bottom.

Other Abbreviations Used In Text:

ch	channel
CRM	Clean Room Monitoring Inst, off the shelf
CRT	Cathode Ray Tube, ie. Computer Monitor or for Oscilloscope
DNA	Data NOT available from product literature.
DR	Data Reduction / Data Analysis
EDS	Energy Dispersive Spectromerty
Fr	Fraction, the number of size fractions the instrument gives data on (includes the filter).
Imp	Impactor
LAS	Laser Aerosol Spectrometer
LPC	Laser Particle Counter

MANUFACTURER'S ADDRESS LIST

COMPANY NAME (DIV OF)
PARENT COMPANY
P.O. BOX
STREET ADDRESS
CITY (ZIP)

Accurex Div of
Andersen Group
4215 Wendell Drive
Atlanta, GA 30336

Air Pollution Technology Inc.
5191 Santa Fe St.
San Diego, CA 92109

Andersen Samplers Div. of
Andersen Group
4215 Wendell Drive
Atlanta, GA 30336

Artek Systems Corp.
Farmingdale, NY

ATM Corporation
Sonic Sifter Division
645 S. 94th Place
West Allis, WI 53214

Bausch & Lomb
Analytical Products Div, Dpt. 8224
820 Linden Ave
Rochester, NY 14625

Belfort Instrument Co.
Subsidiary of TransTechnology Corp.
727 South Wolfe Street
Baltimore, MD 21231

Berkeley Controls Inc.
Div. of Telonic Berkeley Inc.
P.O. Box 277
2825 Laguna Canyon Rd.
Laguna Beach, CA 92652

Brookhaven Instruments Corp.
Equipark Industrial Complex
200 Thirteenth Ave.
Ronkonkoma, NY 11779

California Measurements, Inc.
150 E. Montecito Ave.
Sierra Madre, CA 91024

Canberra Industries, Inc.
One State Street
Meriden, CT 06450

Climet Instruments Co.
Div. of Wehr Corp.
P.O. Box 151
1320 W. Colton Ave.
Redlands, CA 92373

Coulter Electronics, Inc.
P.O. Box 2145
590 West Twentieth St.
Hialeah, FL 33012-0145

Coulter Electronics Inc.
2140 New Market Parkway, Suite 120
Marietta, GA 33067

ETC (Energy Technology Consultants)
4758 Old William Penn Highway
Murrysville, PA 15668

Environment One Corp.
2773 Balltown Rd.
Schenectady, NY 12309

Faley International Corp.
P.O. Box 669
EL Toro, CA 92630

Fisher Foundery, George, Inc.
407 Hodley St.
Holly, Michigan 48442

MANUFACTURER'S ADDRESS LIST

Flow Sensor Div. of
Anderson Group
4215 Wendell Drive
Atlanta, GA 30336

General Electric
Ordnance Systems
#1 River Rd., Bldg. 85-16B
Schenectady, NY 12345

Gilson Company, Inc
P.O. Box 677
Worthington, OH 43085

Hiac/Royco
Instruments Div.
141 Jefferson Dr.
Menlo Park, CA 94025

Horiba Instruments, Inc.
1021 Duryea Ave.
Irvine, CA

In Tox
1712 Virginia N.E.
Albuquerque, NM 87110

J.B. Systems
P.O. Box 2405
La Grange, GA 30241

Joyce-Loebl Div. of
Vickers Instruments Inc.
Riverview Business Park No. 27
P.O. Box 99
300 Commercial St.
Malden, MA 02148

Kanomax International Corp.
2-1, Shimizu, Suita
Osaka, Japan

Leeds & Northrup Co.
Unit of General Signal
Research Division
Dickerson Road
North Wales, PA 19454

Leeds & Northrup Co.
Unit of General Signal
Microtrac Div.
3000 Old Roosevelt Blvd.
St. Petersburg, FL 33702

LeMont Scientific, Inc.
2011 Pine Hall Drive, Science Park
State College, PA 16801

Malvern Instrumen s Inc.
187 Oaks Road
Framingham, MA 01701

Marco Scientific, Inc.
1055 Sunnyvale-Saratoga Rd. #8
Sunnyvale, CA 94087

Micromeritics Instrument Corp.
5680 Goshen Springs Road
Norcross, GA 30093

Nikon

Munhall Co., The
5655 N. High St.
Worthington, OH 43085

Nuclear Data Inc.
Golf and Meacham Roads
Schaumburg, IL 60196

Nutech Corp.
2806 Cheek Road
Durham, NC 27704

Optomax Inc.
9 Ash St., Rt. 130
Hollis, NH 03049

MANUFACTURER'S ADDRESS LIST

Particle Data, Inc. Box 265 (111 Hahn) Elmhurst, IL 60126	Varian Inc. Vaarian Palo Alto Vacuum Div. Palo Alto, CA 94303
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Table A-3: Manufacturer's Model Numbers

KEY No.	Vender/Model No.	Other Numbers:	DESCRIPTION/Comments	Key Parameters	Inst. Type Code	Use Code	$ Quote x 1000
0001	Information on		CODES, column headings, etc is found in	HELP-VENDERS.DAT	ZZZ	ZZZ	
0100	* Accurex:				ZZZ	ZZZ	
0110	SASS		Cyclone Set, Extractive, High Flowrate	4 Fr(F,1->10),complete train;acc. OgM.	CYC	FG:E	26.5
0200	* Air Pollution Tech.				ZZZ	ZZZ	
0210	APT HTP Impactor		Special Purpose Impactor,High Temp&Pres	7 Fr(F,.18->25),1000F, 10Atm	I:CI	FG:I	7.0
0300	* Andersen Samplers				ZZZ	ZZZ	
0310	Mark III Impactor	#50-800	Multi Jet Cascade Impactor,Iso. Stk Smp	9 Fr(F,0.4-> 10)	I:CI	FG:I	4.2
0320	HCSS Impactor	#70-900	High Grain Loading Imp.,Inlet, gm/stage	4 Fr(F,1.5-> 11), several grams per stg	I:CI	FG:I	5.9
0330	Right Angle Pre.Co	#50-160	AV, see Flow Sensor #55-690	Alternate Vender (AV), see Flow S.55-690	I:A	AV	1.6
0340	Preseparater,St.	#50-150	Inline Impactor Precollector	1 Fr(12.2 at 0.5 SCFM), several grams	I:A	FG:I	1.1
0350	Low Pressure Imp	#20-900	Amb. Low Pressure Impactor	14 Fr(F,.08-> 35) 5 LP stages, AMBIENT	I:CI	AAA	5.3
0360	Emission Param. An	#T 1050	Mass Train, for running Impactors,etc.	Std. Method 5/17 Train, 3/4 SCFM	MT17	MA	7.1
0370	Universal Stack Sp	#GII-200	Mass Train, for running Impactors,etc.	Std. Method 5/17 Train, 3/4 SCFM	MT17	MA	7.7
0400	* Artek Systems Corp.				ZZZ	ZZZ	
0410	Image Analysis		Image Analysis	Image Analysis	IAN	L:Oth	IAN
0500	* ATM				ZZZ	ZZZ	
0510	L3P Sonic Sifter		Automated screen sieving,5 screens	5 Fr(5 ->850), any mesh, dry	SIV	L:Oth	4.0
0600	* Bausch & Lomb:				ZZZ	ZZZ	
0610	Omnicon 3500		Image Analysis	Image Analysis	IAN	L:Oth	74.5
0620	EM-2		SEM/EDS Interface, Elem. Chem. by size	Morphology Classes (el. chem vs size)	MA	MA	25.0
0700	* Berkely Contols Inc				ZZZ	ZZZ	
0710	C-2000 QCM Cascade		Amb. Impactor, Quartz Crystal Microbal.	11 Fr(.05-> 35), QCM, AMBIENT	I:CI	AAA	10.5
0800	* Brookhaven Instr.:				ZZZ	ZZZ	
0810	BI-90		OPC (P Cor.), liquidborn	FitFr(.005->5)	O:PC	L:LS	22.5
0900	* Calif. Measurements				ZZZ	ZZZ	
0910	PC-202 QCM		Amb. Impactor, Quartz Crystal Microbal.	10 Fr(.05-> 25), QCM, AMBIENT	I:CI	AAA	15.2
0920	MPS-3		Amb. Impactor,deposits ash on SEM stud	3 Fr(.05-> .3), for SEM, AMBIENT	I:CI	AAA	
1000	* Canberra				ZZZ	ZZZ	
1010	MCA Series 35+	3502	MCA 4K channels, w/options 3541 & 3575	Full Spectrum MCA	PHA	MA	7.6
1100	* Climent:				ZZZ	ZZZ	
1110	Model 226		OPC remote sensor, Airborn, Req. 8040	16 Fr(.3-> 20)	O:A	AAA	4.9
1120	Model 8040		OPC acc., MCA 24Ch, Data R. & print		PHA	MA	7.9
1130	Model 8060		Optical Part. Ct.,Airborn,CleanRoomMont	6 Fr(.3-> 10)	O:A	AAA	7.5
1200	* Coulter:				ZZZ	ZZZ	
1210	TA II L/3 Plus		Volume Displacement of Electrolyte	16 Fr(0.3->800),selectable	RP	L:LS	28.1
1220	Coulter AccuComp		Data Analysis for TA/II L/3 Coul. ctr.	Includes Apple comp. & DR software	MA	MA	
1230	N4-128/MD		OPC (P Cor.), liquidborn	65 Fr(.003->3)	O:PC	L:LS	
1300	* Energy Technology				ZZZ	ZZZ	
1310	CCSEM (Test Lab)		test lab: chem. by size & Morph.; SEM	Monolayer by dilute liquid suspension	IAN	L:Oth	.250
1400	* Environment One :				ZZZ	ZZZ	
1410	Rich 200 CNC		Pulsed Flow Condensation Nuclei Counter	0 Fr(.002 -> 1) Pulsed Flow,Conc. only	CNC	AAA	7.8
1420	Diffusion Denuder		Diffusion Battery, Tubular	1 Fr(.005 -> .1) Threshold type	DB	AAA	2.5
1500	* Faley Internat.:				ZZZ	ZZZ	
1510	Status 2100		Optical Part. Ct.,Airborn,CleanRoomMont	2 Fr(.5-> 5)	O:A	AAA	4.0
1520	Status 4000		Optical Part. Ct.,Airborn,CRM, 1 ACFM	5 Fr(.3-> 5)	O:A	AAA	10.0
1530	Status 5000		Optical Part. Ct.,Airborn,CleanRoomMont	5 Fr(.3-> 5)	O:A	AAA	7.5
1540	FP-303 Opt.		Printer ploter acc. for Faley OPC's	Print & plot only, MCA in sensor pkg.	MA	MA	1.5

KEY No.	Vender/Model No.	Other Numbers:	DESCRIPTION/Comments	Key Parameters	Inst. Type Code	Use Code	$ Quote x 1000
1550	KD-01 Diluter		10:1 Diluter for use with any OPC		MA	MA	.8
1600	* Fisher Foundry Inc.				ZZZ	ZZZ	
1610	BAHCO Classifier	No. 6000	ASME PTC-28 procedure for Terminal Vel.	8 Fr(2.2' -> 54)	CET	L:AR	9.1
1700	* Flow Sensor Div.				ZZZ	ZZZ	
1710	Mark 3	#55-500	Multi Jet Cascade Impactor,Iso. Stk Smp	9 Fr(F,.5 -> 10)	I:CI	FG:I	5.3
1720	Mark 4	#55-530	Multi Jet Cascade Impactor,Iso. Stk Smp	8 Fr(F,.5 -> 7)	I:CI	FG:I	5.8
1730	Right Angle Pre.Co	#55-690	Right Angle Impactor Precollector	1 Fr(11 at 0.5 SCFM), several grams	I:A	FG:I	1.6
1740	6-Stage Cyclone	#65-600	Cyclone Set w/ SoRI 1,2,3,4,5,F	Alternate Vender (AV), see Sierra 285-K	CYC	FG:I	7.6
1750	4-Stage Cyclone	#65-610	Cyclone Set w/ SoRI 1, 3, 5,F	Alternate Vender (AV), see Sierra 283-2K	CYC	FG:I	4.7
1760	3-Stage Cyclone	#65-620	Cyclone Set w/ SoRI 1, 5,F	3 Fr(F, .3 ->10),10gm/stg. SoRI design	CYC	FG:I	1.1
1800	* General Eletric Ord				ZZZ	ZZZ	
1810	CNC-2		Pulsed Flow Condensation Nuclei Counter	0 Fr(.001 -> .1) Pulsed Flow,Conc. only	CNC	AAA	10.3
1900	* Gilson:				ZZZ	ZZZ	
1910	Gilson Sieve Shakr	SS-8R	Priced w/Mesh 60,100,200,& 325 + SV8 P	Holds 8 sieves at a time	SIV	L:Oth	1.3
1920	Comp-sieve Anal.Sy	CP-2	Electronic Bal. System for Autom. Sieve	Inc. Computer,DR software,& print/plot	MA	MA	7.8
1930	ATM sonic Sifter	AT-3	(see ATM) alt. Vender	Alternate Vender (AV), see ATM	SIV	L:Oth	4.0
1940	Laser Particle Cou	SA-1000	OPC (F Dif.), liquidborn	1 Fr(1->100), Threshold Control	O:L	L:LS	10.2
1950	Particle Profile	SAA-3	Data analysis Acc. for SA-1000	16 ch MCA, DR software & hardware	PHA	MA	7.9
1960	Fritsch Pipette CF	SA-50	Manual Centrifugal Sedimentation Sizing	10 Fr(.05 -> 5) Manual,Liquid suspen.	CSED	L:LS	7.0
1970	Cyclosizer Analyzr	SA-150	Liquid Suspension, Cyclone Set	Amb., Liquid susp. 5 Fr(11->44)	CYC	L:LS	22.8
1975	Bahco Classifier	SA-160	(see Fisher Foundery, Bahco) alt. Vendr	Alternate Vender (AV), see Fisher Found.	CET	AV	10.4
1980	Infrasizer,Gilson	SA-180	Air Elutriation dev., powder seperation	7 Fr(F,10->100), 100 gm/hr rate	Misc	L:AR	6.4
1985	Photo Micron Sizer	#SA-2000S	Automated Spirometer, Centrifugal Sedim	many Fr(.01->500) Liquid Suspension	CSED	L:LS	20.9
1990	Andreasen S. Pipet	#SA-40	Glassware for Manual Sedimentation Ext.	Manual technique (1-> 100),Stokes Law	GSED	L:LS	.1
2000	* HIAC/Royco:				ZZZ	ZZZ	
2010	Model 4100	Main Frame	OPC acc., MCA 6Ch, Data R. & print	full data analysis,.3um->600um setable	PHA	MA	6.6
2020	Model 4101 System	w/sensor 1100	OPC (scatter),airborn;CRM, 4100 w/sen.	1100 Sensor,6 Fr(.5->20) 1cfm	O:A	AAA	7.7
2030	Model 4102 System	w/sensor 1200	OPC (scatter),airborn;CRM, 4100 w/sen.	1200 Sensor,6 Fr(.5->20).1cfm or .01cfm	O:A	AAA	8.7
2040	Model 4130 System	w/sensor 1000A	OPC (scatter),airborn;CRM, 4100 w/sen.	1000 Sensor,6 Fr(.3->15) 1cfm	O:A	AAA	14.0
2050	Model 5100	(stand alone)	Optical Part. Ct.,Airborn,CRM stand al.	stand alone,.25-10um,1cfm,	O:A	AAA	9.8
2051	(cont)	cont.	cont.	cont.	O:A	AAA	cont.
2060	Model 4103 System	w/sensor 3000	OPC (scatter),liquidborn; 4100 w/sen.	3000 Sensor, 6Fr(1->300),batch	O:L	L:LS	
2070	Model 4113 System	w/sensor 346	OPC (scatter),liquidborn; 4100 w/sen.	346B Sensor, 6Fr(0.4->25),batch	O:L	L:LS	17.0
2080	HIAC 4300	Main Frame	OPC acc., MCA 32Ch, Data R. & print	full data analysis,1-9000um setable	PHA	MA	8.5
2085	HIAC 4313 System	w/sensor 346	OPC (scatter),liquidborn; 4300 w/sen.	346B Sensor,32Fr(0.4->25)	O:LB	L:LS	22.9
2090	NICOMP Model 270		OPC (P Cor.), liquidborn	64 Fr(.005->3), CRT	O:PC	L:LS	27.9
2100	* Horiba:				ZZZ	ZZZ	
2110	CAPA-500 Spirom.		Automated Spirometer, Centrifugal Sedim	many Fr(.02->100) Liquid Suspension	CSED	L:LS	22.0
2200	* In Tox:				ZZZ	ZZZ	
2210	5-Series Cyclone		Cyclone Set w/ SoRI 1,2,3,4,5,F	Alternate Vender (AV), see Sierra 285-K	CYC	FG:I	4.8
2221	DB 02-1900		Screen Diffusion Battery	10 Fr(.003 -> .3)	DB	AAA	
2300	* Joyce/Loebl(England				ZZZ	ZZZ	
2310	Disk Centrifuge 4	#7AA5300	Automated Spirometer, Centrifugal Sedim	many Fr(.01-> 60) Liquid Suspension	CSED	L:LS	32.4
2320	DCF Data An. Pkg.	F910001	Software & Interface Hardware for Apple	Major Acc for Disk Centrifuge	MA	MA	4.0
2330	Apple IIe Comp.	F665463	Computer, hardware only,w/ printer	Major Acc for Disk Centrifuge	MA	MA	2.6

Table A-3: Manufacturer's Model Numbers

KEY No.		Vender/Model No.	Other Numbers:	DESCRIPTION/Comments	Key Parameters	Inst. Type Code	Use Code	$ Quote x 1000
2400	*	Leeds & Northrup:				ZZZ	ZZZ	
2410		Microtrac 7995-10		OPC (F Dif.), liquidborn	13 Fr(0.7->125)	O:FD	L:LS	33.3
2420		7995-30Small Part.		OPC (F Dif. & side scattering),liquidb.	16 Fr(.12-> 42)	O:FD	L:LS	33.9
2500	*	Leeds & North. Res				ZZZ	ZZZ	
2510		Stack Part. Monit.		Optical Particle Counter, Airborn ,Stk.	5 Fr(1.2-> 20),Outlets	O:FD	FG:I	QUOTE
2600	*	Lemont:				ZZZ	ZZZ	
2610		DA-10		Image Analysis	Image Analysis / EDS	IAN	L:Oth	57.0
2700	*	Malvern:				ZZZ	ZZZ	
2710		2600D Spray D Any		OPC (F Dif.), airborn w/acc. for liquid	16 Fr(0.5->1800)	O:FD	AAA	28.0
2720		Autosizer II		OPC (P Cor.), liquidborn	32 Fr(.01-> 3)	O:PC	L:LS	22.5
2730		Model 3600E		OPC (F Dif.), liquidborn	Cross Reference (CR) to 2600D for spec.	O:FD	L:LS	29.5
2800	*	Marco Scientific:				ZZZ	ZZZ	
2810		Granulometer		OPC (F Dif.), liquidborn	16 Fr(1.0->192)	O:FD	L:LS	33.0
2900	*	Belfort				ZZZ	ZZZ	
2910		Belfort 1502	MRI Model 1502	Multi Jet Cascade Impactor,Iso. Stk Smp	8 Fr(F,.5 -> 9)	I:CI	FG:I	2.1
3000	*	Micromeritics:				ZZZ	ZZZ	
3010		Sedigraph 5000ET		Automated Sedimentation Sizing,X-ray	21 Fr(.1 ->100) Liquid Suspension	GSED	L:LS	23.8
3100	*	Munhall Co. ,The:				ZZZ	ZZZ	
3120		Image Any. System		Image Analysis	Image Analysis	IAN	L:Oth	IAN
3200	*	Nicon				ZZZ	ZZZ	
3210		Magiscan 2		Image Analysis	Image Analysis	IAN	L:Oth	IAN
3300	*	Nuclear Data Inc.				ZZZ	ZZZ	
3310		ND 62 MCA		MCA 4K channels, w/CMOS	Full Spectrum MCA	PHA	MA	5.9
3400	*	Nutech Corp.				ZZZ	ZZZ	
3410		Nutech 2010		Mass Train, for running Impactors,etc.	Std. Method 5/17 Train, 3/4 SCFM	MT17	MA	6.3
3420		Nutech 220-2	220-2	Mass Train, for running Impactors,etc.	Mth. 6 Control Box, for Low Flow Imp.	MT17	MA	1.7
3500	*	Optomax:				ZZZ	ZZZ	
3510		Image Any. System		Image Analysis	Image Analysis	IAN	L:Oth	IAN
3600	*	Particle Data Inc.:				ZZZ	ZZZ	
3610		180LSD/ADC-80XY/KP		Volume Displacement of Electrolyte	128Fr(0.3->1900)selectable	RP	L:LS	20.4
3700	*	Particle Measuring				ZZZ	ZZZ	
3710		FPSSS	FPSSS-100	Optical Particle Counter, Airborn ,Stk.	60 Fr(.4->11)	O:A	FG:I	46.0
3720		LPC-101		Optical Part. Ct.,Airborn,CRM	4 Fr(.1->10)	O:A	AAA	13.5
3730		LAS-250X-CRT		Optical Part. Ct.,Airborn,CRM	16 Fr(.2->12)	O:A	AAA	15.3
3800	*	Pollution Control				ZZZ	ZZZ	
3810		Mark 3		Multi Jet Cascade Impactor,Iso. Stk Smp	8 Fr(F,.3 -> 10)	I:CI	FG:I	3.0
3820		Mark 5		Multi Jet Cascade Impactor,Iso. Stk Smp	12 Fr(F,.2 -> 20)	I:CI	FG:I	3.9
3830		Mark 10		Sys w/regular pressure & low press. Imp	28 Fr(F,.05-> 20), stk sampler,6 Low P S	I:CI	FG:I	21.1
3840		Mark 20B		Sys w/regular pressure & low press. Imp	15 Fr(F,.05-> 20), stk sampler,6 Low P S	I:CI	FG:I	21.1
3850		MARK 8		High Grain loading Imp.,Inlets, gm/stag	DNA Fr(F, ->)	I:CI	FG:I	QUOTE
3860		Right Angle Pre.Co		Right Angle Impactor Precollector	1 Fr(DNA at 0. SCFM), several grams	I:A	FG:I	1.3
3870		BCURRA Cyc.		Used as a Right Angle Impactor Precoll.	1 Fr(5um at 0.5 ACFM, 212F),several gm	I:A	FG:I	1.5
3900	*	Polytec Optronics				ZZZ	ZZZ	
3910		HN-15 Karlsruhe		Optical Part. Ct.,Airborn, research	64 Fr(0.5-> 20)	O:A	AAA	
4000	*	Research Appliance				ZZZ	ZZZ	
4010		RAC Stacksamplr	#201108	Mass Train, for running Impactors,etc.	Std. Method 5/17 Train, 3/4 SCFM	MT17	MA	7.8

KEY No.	Vender/Model No.	Other Numbers:	DESCRIPTION/Comments	Key Parameters	Inst. Type Code	Use Code	$ Quote x 1000
4100	* Sierra Inst. DAG				ZZZ	ZZZ	
4110	Model 226		Multi Jet Cascade Impactor,Iso. Stk Smp	7 Fr(F, .9-> 14)	I:CI	FG:I	2.9
4120	Model 228		Multi Jet Cascade Impactor,Iso. Stk Smp,	9 Fr(F, .3-> 18)	I:CI	FG:I	3.8
4130	Model 2210		Sys w/regular pressure & low press. Imp	11 Fr(F,.09-> 28), stk sampler, 2Low PS	I:CI	FG:I	4.7
4140	Cyclade 285-K		Cyclone Set w/ SoRI 1,2,3,4,5,F	6 Fr(F, .3 -> 10),10gm/stg. SoRI design	CYC	FG:I	7.1
4150	Cyclade 286-1K		Cyclone Set w/ SoRI 10, 1,2,3,4,5,F	7 Fr(F, .7 -> 15),10gm/stg. SoRI design	CYC	FG:I	8.6
4160	Cyclade 286-2K		Cyclone Set w/ SoRI 9,1,2,3,4,5,F	7 Fr(F,1.0 -> 15),10gm/stg. SoRI design	CYC	FG:I	8.8
4170	Cyclade 283-2K		Cyclone Set w/ SoRI 1 3, 5,F	4 Fr(F, .3 -> 10),10gm/stg. SoRI design	CYC	FG:I	4.7
4180	Model 220 CP		Cyclone design Impactor precollector	1 Fr(9.2 at 0.25SCFM), several grams	I:A	FG:I	0.8
4200	* Southern Res. Inst.				ZZZ	ZZZ	
4210	SEDS	UFPS Diluter	Sample Extraction Dilution System	Stk Sampling, Amb.-700F,15:1-2000:1	DIL	MA	QUOTE
4250	* Spectrex:				ZZZ	ZZZ	
4260	ILI 1000	#6700000	OPC (F Dif.), liquidborn	16 Fr(0.5->100)	O:FD	L:LS	
4270	PPA-4	#6700810	PHA for ILI 1000 ,w/Apple IIe	PHA & DR , 17 ch MCA	PHA	MA	
4300	* Spectron Dev. Lab.:				ZZZ	ZZZ	
4310	Particle Sizing Interferometer		OPC (Dual), spray droplet type	DNA Fr(.5-> 25),cross stk.w/focused view	O:FD	FG:I	QUOTE
4400	* TSI:				ZZZ	ZZZ	
4405	EAA 3030	#3030	Elec. Aerosol Size Analy. w/o DR system	(Cross Ref.to EAA 3930 Sy for specs.)	EM	AAA	20.8
4410	EAA 3930 Sy	#3930	EAA 3030 w/ Apple soft. & computer	10 Fr(.003 ->1.0)	EM	AAA	29.7
4420	DB/CNC 3931 Sy	#3931	DB, switching valves,& CNC w/o Apple	10 Fr(.005 -> .2)	DB	AAA	26.1
4430	DMPS/C 3932 Sy	#3932	EMC(Electro.MobilityClass),CNC,& Apple	32 Fr(.01 ->1.0)	EM	AAA	42.0
4440	APS 33 Sy	#3300I	Aerodynamic Particle Sizer w/o computer	48 Fr(.5 -> 15)	AT	AAA	29.5
4445	IBM-XT(DR for APS)	#3900XT	Data Reduction Hardware/Soft. for APS	computer & software	MA	MA	8.9
4450	CNC 3020	#3020	Continuous Flow Conden. Nuclei Counter	0 Fr(.01 -> 1) Cont. Flow,Conc. only	CNC	AAA	17.0
4460	DB 3040	#3040	Screen Diffusion Battery, opt. Switch V	10 Fr(.005 -> .2)	DB	AAA	4.9
4470	Diluter 3302		Lab Diluter, accesory to the APS 33	100:1 or 20:1, 5 lpm total output	DIL	MA	3.7
4500	* Unitron				ZZZ	ZZZ	
4510	Model 1A1000		Image Analysis	Image Analysis	IAN	L:Oth	IAN
4600	* Varian:				ZZZ	ZZZ	
4610	Image Any. System		Image Analysis	Image Analysis	IAN	L:Oth	IAN
4700	* Wyatt Technology				ZZZ	ZZZ	
4710	Dawn Model B		OPC (F Dif.), liquidborn	16 Fr(0.6-> 50)	O:FD	L:LS	17.0
4720	Columbia MPC	#1600-IV	Data Analysis, etc for DAWN	computer & software	PHA	MA	2.5
4800	* Zeiss:				ZZZ	ZZZ	
4810	IBAS		Image Analysis	Image Analysis	IAN	L:Oth	IAN
4900	* Zoltec:				ZZZ	ZZZ	
4910	Brink Model C		Impactor,Low Flow (Inlet, High Loading)	8 Fr(F,.5 -> 9)	I:CI	FG:I	2.9

Table A-4: Instrument Type Sorted: Description

KEY No.	Inst. Type Code	Use Code	Manufacturer	Vender/Model No.	Other Numbers:	$ Quote x 1000	DESCRIPTION/Comments	Key Parameters
4440	AT	AAA	TSI:	APS33 Sy	#3300I	29.5	Aerodynamic Particle Sizer w/o computer	48 Fr(.5 -> 15)
1975	CET	AV	Gilson	Bahco Classifier	SA-160	10.4	(see Fisher Foundery, Bahco) alt. Vendr	Alternate Vender (AV), see Fisher Found.
1610	CET	L:AR	Fisher Foundry Inc.	BAHCO Classifier	No.6000	9.1	ASME PTC-28 procedure for Terminal Vel.	8 Fr(2.2 -> 54)
1410	CNC	AAA	Environment One :	Rich 200 CNC		7.8	Pulsed Flow Condensation Nuclei Counter	0 Fr(.002-> 1) Pulsed Flow, Conc. only
1810	CNC	AAA	General Electric Ord	CNC-2		10.3	Pulsed Flow Condensation Nuclei Counter	0 Fr(.001-> .1) Pulsed Flow, Conc. only
4450	CNC	AAA	TSI:	CNC 3020	#3020	17.0	Continuous Flow Conden. Nuclei Counter	0 Fr(.01 -> 1) Cont. Flow, Conc. only
1960	CSED	L:LS	Gilson	Fritsch Pipette CF	SA-50	7.0	Manual Centrifugal Sedimentation Sizing	10 Fr(.05 -> 5) Manual,Liquid suspen.
1985	CSED	L:LS	Gilson	Photo Micron Sizer	#SA-2000S	20.9	Automated Spirometer, Centrufugal Sedim	many Fr(.01->500)Liquid Suspension
2110	CSED	L:LS	Horiba:	CAPA-500 Spirom.		22.0	Automated Spirometer, Centrufugal Sedim	many Fr(.02->100)Liquid Suspension
2310	CSED	L:LS	Joyce/Loebl(England	Disk Centrifuge 4	#7AA5300	32.4	Automated Spirometer, Centrufugal Sedim	many Fr(.01-> 60)Liquid Suspension
0110	CYC	FG:E	Accurex:	SASS		26.5	Cyclone Set, Extractive, High Flowrate	4 Fr(F,1->10),complete train;acc. 0gm.
1740	CYC	FG:I	Flow Sensor Div.	6-Stage Cyclone	#65-600	7.6	Cyclone Set w/ SoRI 1,2,3,4,5	Alternate Vender (AV), see Sierra 285-K
1750	CYC	FG:I	Flow Sensor Div.	4-Stage Cyclone	#65-610	4.7	Cyclone Set w/ SoRI 1, 3, 5	Alternate Vender (AV), see Sierra 283-2K
1760	CYC	FG:I	Flow Sensor Div.	3-Stage Cyclone	#65-620	1.1	Cyclone Set w/ SoRI 1, 5	3 Fr(F, .3 ->10),10gm/stg. SoRI design
2210	CYC	FG:I	In Tox:	5-Series Cyclone		4.8	Cyclone Set w/ SoRI 1,2,3,4,5	Alternate Vender (AV), see Sierra 285-K
4140	CYC	FG:I	Sierra Inst. DAG	Cyclade 285-K		7.1	Cyclone Set w/ SoRI 1,2,3,4,5	6 Fr(F, .3 -> 10),10gm/stg. SoRI design
4150	CYC	FG:I	Sierra Inst. DAG	Cyclade 286-1K		8.6	Cyclone Set w/ SoRI 10, 1,2,3,4,5	7 Fr(F, .7 -> 15),10gm/stg. SoRI design
4160	CYC	FG:I	Sierra Inst. DAG	Cyclade 286-2K		8.8	Cyclone Set w/ SoRI 9,1,2,3,4,5	7 Fr(F,1.0 -> 15),10gm/stg. SoRI design
4170	CYC	FG:I	Sierra Inst. DAG	Cyclade 283-2K		4.7	Cyclone Set w/ SoRI 1, 3, 5	4 Fr(F, .3 -> 10),10gm/stg. SoRI design
1970	CYC	L:LS	Gilson	Cyclosizer Analyzr	SA-150	22.8	Liquid Suspension, Cyclone Set	Amb., Liquid susp. 5 Fr(11->44)
1420	DB	AAA	Environment One :	Diffusion Denuder		2.5	Diffusion Battery, Tubular	1 Fr(.005 -> .1) Threshold type
2221	DB	AAA	In Tox:	DB 02-1900		DNA	Screen Diffusion Battery	10 Fr(.003 -> .3)
4420	DB	AAA	TSI:	DB/CNC 3931 Sy	#3931	26.1	DB, switching valves,& CNC w/o Apple	10 Fr(.005 -> .2)
4460	DB	AAA	TSI:	DB 3040	#3040	4.9	Screen Diffusion Battery, opt. Switch V	10 Fr(.005 -> .2)
4210	DIL	MA	Southern Res. Inst.	SEDS	UFPS Diluter	QUOTE	Sample Extraction Dilution System	Stk Sampling, Amb.-700F,15:1-2000:1
4470	DIL	MA	TSI:	Diluter 3302		3.7	Lab Diluter, accesory to the APS 33	100:1 or 20:1, 5 lpm total output
4405	EM	AAA	TSI	EAA 3030	#3030	20.8	Elec. Aerosol Size Analy. w/o DR system	(Cross Ref.to EAA 3930 Sy for specs.)
4410	EM	AAA	TSI:	EAA 3930 Sy	#3930	29.7	EAA 3030 w/ Apple soft. & computer	10 Fr(.003 ->1.0)
4430	EM	AAA	TSI:	DMPS/C 3932 Sy	#3932	42.0	EMC(Electro.MobilityClass),CNC,& Apple	32 Fr(.01 ->1.0)
1990	GSED	L:LS	Gilson	Andreasen S. Pipet	#SA-40	.1	Glassware for Manual Sedimentation Ext.	Manual technique (1-> 100),Stokes Law
3010	GSED	L:LS	Micromeritics:	Sedigraph 5000ET		23.8	Automated Sedimentation Sizing,X-ray	21 Fr(.1 ->100) Liquid Suspension
0330	I:A	AV	Andersen Samplers	Right Angle Pre.Co	#50-160	1.6	AV, see Flow Sensor #55-690	Alternate Vender (AV), see Flow S.55-690
0340	I:A	FG:I	Andersen Samplers	Preseparater,St.	#50-150	1.1	Inline Impactor Precollector	1 Fr(12.2 at 0.5 SCFM), several grams
1730	I:A	FG:I	Flow Sensor Div.	Right Angle Pre.Co	#55-690	1.6	Right Angle Impactor Precollector	1 Fr(11 at 0.5 SCFM), several grams
3860	I:A	FG:I	Pollution Control	Right Angle Pre.Co		1.3	Right Angle Impactor Precollector	1 Fr(DNA at 0. SCFM), several grams
3870	I:A	FG:I	Pollution Control	BCURRA Cyc.		1.5	Used as a Right Angle Impactor Precoll.	1 Fr(5um at 0.5 ACFM, 212F),several gm
4180	I:A	FG:I	Sierra Inst. DAG	Model 220 CP		0.8	Cyclone design Impactor precollector	1 Fr(9.2 at 0.25SCFM), several grams
0350	I:CI	AAA	Andersen Samplers	Low Pressure Imp	#20-900	5.3	Amb. Low Pressure Impactor	14 Fr(F,.08-> 35) 5 LP stages, AMBIENT
0710	I:CI	AAA	Berkely Controls In	C-2000 QCM Cascade		10.5	Amb. Impactor, Quartz Crystal Microbal.	11 Fr(.05-> 35), QCM, AMBIENT
0910	I:CI	AAA	Calif. Measurements	PC-202 QCM		15.2	Amb. Impactor, Quartz Crystal Microbal.	10 Fr(.05-> 25), QCM, AMBIENT
0920	I:CI	AAA	Calif. Measurements	MPS-3		DNA	Amb. Impactor,deposits ash on SEM stud	3 Fr(.05-> .3), for SEM, AMBIENT
0210	I:CI	FG:I	Air Pollution Tech.	APT HTP Impactor		7.0	Special Purpose Impactor,High Temp&Pres	7 Fr(F,.18->25),1000F, 10Atm
0310	I:CI	FG:I	Andersen Samplers	Mark III Impactor	#50-800	4.2	Multi Jet Cascade Impactor,Iso. Stk Smp	9 Fr(F,0.4-> 10)
0320	I:CI	FG:I	Andersen Samplers	HCSS Impactor	#70-900	5.9	High Grain Loading Imp.,Inlet, gm/stage	4 Fr(F,1.5-> 11), several grams per stg
1710	I:CI	FG:I	Flow Sensor Div.	Mark 3	#55-500	5.3	Multi Jet Cascade Impactor,Iso. Stk Smp	9 Fr(F,.5 -> 10)
1720	I:CI	FG:I	Flow Sensor Div.	Mark 4	#55-530	5.8	Multi Jet Cascade Impactor,Iso. Stk Smp	8 Fr(F,.5 -> 7)

KEY No.	Inst. Type Code	Use Code	Manufacturer	Vender/Model No.	Other Numbers:	$ Quote x 1000	DESCRIPTION/Comments	Key Parameters
2910	I:CI	FG:I	Belfort	Belfort 1502	MRI Model 1502	2.1	Multi Jet Cascade Impactor,Iso. Stk Smp	8 Fr(F,.5 -> 9)
3810	I:CI	FG:I	Pollution Control	Mark 3		3.0	Multi Jet Cascade Impactor,Iso. Stk Smp	8 Fr(F,.3 -> 10)
3820	I:CI	FG:I	Pollution Control	Mark 5		3.9	Multi Jet Cascade Impactor,Iso. Stk Smp	12 Fr(F,.2 -> 20)
3830	I:CI	FG:I	Pollution Control	Mark 10		21.1	Sys w/regular pressure & low press. Imp	28 Fr(F,.05-> 20), stk sampler,6 Low P S
3840	I:CI	FG:I	Pollution Control	Mark 20B		21.1	Sys w/regular pressure & low press. Imp	15 Fr(F,.05-> 20), stk sampler,6 Low P S
3850	I:CI	FG:I	Pollution Control	MARK 8		QUOTE	High Grain loading Imp.,Inlets, gm/stag	DNA Fr(F,1 -> 10)
4110	I:CI	FG:I	Sierra Inst. DAG	Model 226		2.9	Multi Jet Cascade Impactor,Iso. Stk Smp	7 Fr(F, .9-> 14)
4120	I:CI	FG:I	Sierra Inst. DAG	Model 228		3.8	Multi Jet Cascade Impactor,Iso. Stk Smp	9 Fr(F, .3-> 18)
4130	I:CI	FG:I	Sierra Inst. DAG	Model 2210		4.7	Sys w/regular pressure & low press. Imp	11 Fr(F,.09-> 28), stk sampler,2 Low P S
4910	I:CI	FG:I	Zoltec:	Brink Model C		2.9	Impactor,Low Flow (Inlet, High Loading)	8 Fr(F,.5 -> 9)
0410	IAN	L:Oth	Artek Systems Corp	Image Analysis		IAN	Image Analysis	Image Analysis
0610	IAN	L:Oth	Bausch & Lomb:	Omnicon 3500		74.5	Image Analysis	Image Analysis
1310	IAN	L:Oth	Energy Technology	CCSEM (Test Lab)		.250	test lab: chem. by size & Morph.; SEM	Monolayer by dilute liquid suspension
2610	IAN	L:Oth	Lemont:	DA-10		57.0	Image Analysis	Image Analysis / EDS
3120	IAN	L:Oth	Munhall Co. ,The:	Image Any. System		IAN	Image Analysis	Image Analysis
3210	IAN	L:Oth	Nikon	Magiscan 2		IAN	Image Analysis	Image Analysis
3510	IAN	L:Oth	Optomax:	Image Any. System		IAN	Image Analysis	Image Analysis
4510	IAN	L:Oth	Unitron	Model 1A1000		IAN	Image Analysis	Image Analysis
4610	IAN	L:Oth	Varian:	Image Any. System		IAN	Image Analysis	Image Analysis
4810	IAN	L:Oth	Zeiss:	IBAS		IAN	Image Analysis	Image Analysis
0620	MA	MA	Bausch & Lomb:	EM-2		25.0	SEM/EDS Interface, Elem. Chem. by size	Morphology Classes (el. chem vs size)
1220	MA	MA	Coulter:	Coulter AccuComp		DNA	Data Analysis for TA/II L/3 Coul. ctr.	Includes Apple comp. & DR software
1540	MA	MA	Faley Internat.:	FP-303 Opt.		1.5	Printer ploter acc. for Faley OPC's	Print & plot only, MCA in sensor pkg.
1550	MA	MA	Faley Internat.:	KD-01 Diluter		.8	10:1 Diluter for use with any OPC	
1920	MA	MA	Gilson	Comp-sieve Anal.Sy	CP-2	7.8	Electronic Bal. System for Autom. Sieve	Inc. Computer,DR software,& print/plot
2320	MA	MA	Joyce/Loebl(England	DCF Data An. Pkg.	F910001	4.0	Software & Interface Hardware for Apple	Major Acc for Disk Centrifuge
2330	MA	MA	Joyce/Loebl(England	Apple IIe Comp.	F665463	2.6	Computer, hardware only,w/ printer	Major Acc for Disk Centrifuge
4445	MA	MA	TSI:	IBM-XT(DR for APS)	#3900XT	8.9	Data Reduction Hardware/Soft. for APS	computer & software
0360	MT17	MA	Andersen Samplers	Emission Param. An	#T 1050	7.1	Mass Train, for running Impactors,etc.	Std. Method 5/17 Train, 3/4 SCFM
0370	MT17	MA	Andersen Samplers	Universal Stack Sp	#GII-200	7.7	Mass Train, for running Impactors,etc.	Std. Method 5/17 Train, 3/4 SCFM
3410	MT17	MA	Nutech Corp.	Nutech 2010		6.3	Mass Train, for running Impactors,etc.	Std. Method 5/17 Train, 3/4 SCFM
3420	MT17	MA	Nutech Corp.	Nutech 220-2	220-2	1.7	Mass Train, for running Impactors,etc.	Mth. 6 Control Box, for Low Flow Imp.
4010	MT17	MA	Research Appliance	RAC Stacksamplr	#201108	7.8	Mass Train, for running Impactors,etc.	Std. Method 5/17 Train, 3/4 SCFM
1980	Misc	L:AR	Gilson	Infrasizer,Gilson	SA-180	6.4	Air Elutriation dev., powder seperation	7 Fr(F,10->100), 100 gm/hr rate
1110	O:A	AAA	Climent:	Model 226		4.9	OPC remote sensor, Airborn, Req. 8040	16 Fr(.3-> 20)
1130	O:A	AAA	Climent:	Model 8060		7.5	Optical Part. Ct.,Airborn,CleanRoomMont	6 Fr(.3-> 10)
1510	O:A	AAA	Faley Internat.:	Status 2100		4.0	Optical Part. Ct.,Airborn,CleanRoomMont	2 Fr(.5-> 5)
1520	O:A	AAA	Faley Internat.:	Status 4000		10.0	Optical Part. Ct.,Airborn,CRM, 1 ACFM	5 Fr(.3-> 5)
1530	O:A	AAA	Faley Internat.:	Status 5000		7.5	Optical Part. Ct.,Airborn,CleanRoomMont	5 Fr(.3-> 5)
2020	O:A	AAA	HIAC/Royco:	Model 4101 System	w/sensor 1100	7.7	OPC (scatter),airborn;CRM, 4100 w/sen.	1100 Sensor,6 Fr(.5->20) 1cfm
2030	O:A	AAA	HIAC/Royco:	Model 4102 System	w/sensor 1200	8.7	OPC (scatter),airborn;CRM, 4100 w/sen.	1200 Sensor,6 Fr(.5->20).1cfm or .01cfm
2040	O:A	AAA	HIAC/Royco:	Model 4130 System	w/sensor 1000A	14.0	OPC (scatter),airborn;CRM, 4100 w/sen.	1000 Sensor,6 Fr(.3->15) 1cfm
2050	O:A	AAA	HIAC/Royco:	Model 5100	(stand alone)	9.8	Optical Part. Ct.,Airborn,CRM stand al.	stand alone,.25-10um,1cfm,
2051	O:A	AAA	HIAC/Royco:	(cont)	cont.	cont.	cont.	cont.
3720	O:A	AAA	Particle Measuring	LPC-101		13.5	Optical Part. Ct.,Airborn,CRM	4 Fr(.1->10)
3730	O:A	AAA	Particle Measuring	LAS-250X-CRT		15.3	Optical Part. Ct.,Airborn,CRM	16 Fr(.2->12)

Table A-4: Instrument Type Sorted: Description

KEY No.	Inst. Type Code	Use Code	Manufacturer	Vender/Model No.	Other Numbers:	$ Quote x 1000	DESCRIPTION/Comments	Key Parameters
3910	O:A	AAA	Polytec Optronics	HN-15 Karlsruhe		DNA	Optical Part. Ct.,Airborn, research	64 Fr(0.5-> 20)
3710	O:A	FG:I	Particle Measuring	FPSSS	FPSSS-100	46.0	Optical Particle Counter, Airborn ,Stk.	60 Fr(.4->11)
2710	O:FD	AAA	Malvern:	2600D Spray D Any		28.0	OPC (F Dif.), airborn w/acc. for liquid	16 Fr(0.5->1800)
2510	O:FD	FG:I	Leeds & North. Res	Stack Part. Monit.		QUOTE	Optical Particle Counter, Airborn ,Stk.	5 Fr(1.2-> 20),Outlets
4310	O:FD	FG:I	Spectron Dev. Lab.:	Particle Sizing Interferometer		QUOTE	OPC (Dual), spray droplet type	DNA Fr(.5-> 25),cross stk.w/focused view
2410	O:FD	L:LS	Leeds & Northrup:	Microtrac 7995-10		33.3	OPC (F Dif.), liquidborn	13 Fr(0.7->125)
2420	O:FD	L:LS	Leeds & Northrup:	7995-30Small Part.		33.9	OPC (F Dif. & side scattering),liquidb.	16 Fr(.12-> 42)
2730	O:FD	L:LS	Malvern:	Model 3600E		29.5	OPC (F Dif.), liquidborn	Cross Reference (CR) to 2600D for spec.
2810	O:FD	L:LS	Marco Scientific:	Granulometer		33.0	OPC (F Dif.), liquidborn	16 Fr(1.0->192)
4260	O:FD	L:LS	Spectrex:	ILI 1000	#6700000	?	OPC (F Dif.), liquidborn	16 Fr(0.5->100)
4710	O:FD	L:LS	Wyatt Technology	Dawn Model B		17.0	OPC (F Dif.), liquidborn	16 Fr(0.6-> 50)
1940	O:L	L:LS	Gilson	Laser Particle Cou	SA-1000	10.2	OPC (F Dif.), liquidborn	1 Fr(1->100), Threshold Control
2060	O:L	L:LS	HIAC/Royco:	Model 4103 System	w/sensor 3000	?	OPC (scatter),liquidborn; 4100 w/sen.	3000 Sensor, 6Fr(1->300),batch
2070	O:L	L:LS	HIAC/Royco:	Model 4113 System	w/sensor 346	17.0	OPC (scatter),liquidborn; 4100 w/sen.	346B Sensor, 6Fr(0.4->25),batch
2085	O:LB	L:LS	HIAC/Royco:	HIAC 4313 System	w/sensor 346	22.9	OPC (scatter),liquidborn; 4300 w/sen.	346B Sensor,32Fr(0.4->25)
0810	O:PC	L:LS	Brookhaven Instr.:	BI-90		22.5	OPC (P Cor.), liquidborn	FitFr(.005->5)
1230	O:PC	L:LS	Coulter:	N4-128/MD		DNA	OPC (P Cor.), liquidborn	65 Fr(.003->3)
2090	O:PC	L:LS	HIAC/Royco:	NICOMP Model 270		27.9	OPC (P Cor.), liquidborn	64 Fr(.005->3), CRT
2720	O:PC	L:LS	Malvern:	Autosizer II		22.5	OPC (P Cor.), liquidborn	32 Fr(.01-> 3)
1010	PHA	MA	Canberra	MCA Series 35+	3502	7.6	MCA 4K channels, w/options 3541 & 3575	Full Spectrum MCA
1120	PHA	MA	Climent:	Model 8040		7.9	OPC acc., MCA 24Ch, Data R. & print	
1950	PHA	MA	Gilson	Particle Profile	SAA-3	7.9	Data analysis Acc. for SA-1000	16 ch MCA, DR software & hardware
2010	PHA	MA	HIAC/Royco:	Model 4100	Main Frame	6.6	OPC acc., MCA 6Ch, Data R. & print	full data analysis,.3um->600um setable
2080	PHA	MA	HIAC/Royco:	HIAC 4300	Main Frame	8.5	OPC acc., MCA 32Ch, Data R. & print	full data analysis,1-9000um setable
3310	PHA	MA	Nuclear Data Inc.	ND 62 MCA		5.9	MCA 4K channels, w/CMOS	Full Spectrum MCA
4270	PHA	MA	Spectrex:	PPA-4	#6700810	?	PHA for ILI 1000 ,w/Apple IIe	PHA & DR , 17 ch MCA
4720	PHA	MA	Wyatt Technology	Columbia MPC	#1600-IV	2.5	Data Analysis, etc for DAWN	computer & software
1210	RP	L:LS	Coulter:	TA II L/3 Plus		28.1	Volume Displacement of Electrolyte	16 Fr(0.3->800),selectable
3610	RP	L:LS	Particle Data Inc.:	180LSD/ADC-80XY/KP		20.4	Volume Displacement of Electrolyte	128Fr(0.3->1900)selectable
0510	SIV	L:Oth	ATM	L3P Sonic Sifter		4.0	Automated screen sieving,5 screens	5 Fr(5 ->850), any mesh, dry
1910	SIV	L:Oth	Gilson	Gilson Sieve Shakr	SS-8R	1.3	Priced w/Mesh 60,100,200,& 325 + SV8 P	Holds 8 sieves at a time
1930	SIV	L:Oth	Gilson	ATM sonic Sifter	AT-3	4.0	(see ATM) alt. Vender	Alternate Vender (AV), see ATM

KEY No.	Inst. Type Code	Use Code	Vender/Model No.	Comments (1 of 3)	Comments continued (2 of 3)	Comments continued (3 of 3)
4440	AT	AAA	APS 33 Sy	(.5, .54, .58, -> 15 by 1.075 ratio)		
1975	CET	AV	BAHCO Classifier	AV	AV	AV
1610	CET	L:AR	BAHCO Classifier	(2.2, 3.5, 7, 13, 21, 36, 48, 54) for	1.0 gm/cc. Terminal Settling Velocity	
1410	CNC	AAA	Rich 200 CNC	Sizing must be performed by a separate	instrument (DB,EM,etc.).	
1810	CNC	AAA	CNC-2	Sizing must be performed by a separate	instrument (DB,EM,etc.).	
4450	CNC	AAA	CNC 3020	Sizing must be performed by a separate	instrument (DB,EM,etc.).	
1960	CSED	L:LS	Fritsch Pipette CF	Conc. by dry weight, size by run time and	radius at Pipette point. Extends Andreasen	Pipet method into submicron range.
1985	CSED	L:LS	Photo Micron Sizer	Import,Seishin, Computer controled	centrifuge.Concentration by photo-extention.	Size is operator selectable.
2110	CSED	L:LS	CAPA-500 Spirom.	Import,Japan. Computer controled	centrifuge.Concentration by photo-extention.	Size is operator selectable.
2310	CSED	L:LS	Disk Centrifuge 4	Import,England. Computer controled	centrifuge.Concentration by photo-extention.	Size is operator selectable.
0110	CYC	FG:E	SASS	3 cyc set + F, 4 SCFM (10,3,1,F) with an	organics module ($ +8.3K) accessory	Source Assesment Sampling System
1740	CYC	FG:I	6-Stage Cyclone	AV		
1750	CYC	FG:I	4-Stage Cyclone	AV		
1760	CYC	FG:I	3-Stage Cyclone	1.0 ACFM,300F (F, .57, 7.5)		
2210	CYC	FG:I	5-Series Cyclone	AV		
4140	CYC	FG:I	Cyclade 285-K	1.0 ACFM,300F (F, .57, 1.1, 2.7, 3.5,	7.5)	
4150	CYC	FG:I	Cyclade 286-1K	0.8 ACFM,300F (F, .73, 1.3, 2.5, 4.2,	8.5, 15); 15um IP	
4160	CYC	FG:I	Cyclade 286-2K	0.5 ACFM,300F (F, 1.0, 2.2, 4.5, 6.0,	11 , 15); 15um IP	
4170	CYC	FG:I	Cyclade 283-2K	1.0 ACFM,300F (F, .57, 2.7, 7.5)		
1970	CYC	L:LS	Cyclosizer Analyzr	0.5 SCFM liquid (11, 15, 23, 33, 44)		
1420	DB	AAA	Diffusion Denuder	Adjust flow to change D50.		
2221	DB	AAA	DB 02-1900	Screen DB, Stainless Steel		
4420	DB	AAA	DB/CNC 3931 Sy	Includes DB 3040, Switching Valve 3042,	and CNC 3020	
4460	DB	AAA	DB 3040-I	Used with DB/CNC System 3931, screen DB's		
4210	DIL	MA	SEDS	Prototype system designed for stk. sampling	use. Extracts, dilutes and conditions	sample for amb.inst. (.01-1.5 micron)
4470	DIL	MA	Diluter 3302	Lab diluter (Amb.) intended as an accessory	for the APS 33 for high concentration	Aerosols. Capilary diluter,fixed,20,100.
4405	EM	AAA	EAA 3030	Cross Reference (CR)	CR	CR
4410	EM	AAA	EAA 3930 Sy	0.14 SCFM(.0042, .0075, .0133, .024,.042	, .075, .013, .24, .42, .75)	
4430	EM	AAA	DMPS/C 3932 Sy	Includes Electrostatic Classifer 3071,	CNC 3020 for low concentrations and	computer hardware/data analysis pkg 3900-71.
1990	GSED	L:LS	Andreasen S. Pipet	Extract dilute liquid suspension at	different time intervals, dry and weigh.	Qty of extract. sets qty of size cuts.
3010	GSED	L:LS	Sedigraph 5000ET	(.3, .4, .5, .6, .7, .8, .9, 1, 2, 3, 4,	5, 6, 7, 8, 9, 10, 20, 30, 40, 50), conc	by X-ray attinuation
0330	I:A	AV	Right Angle Pre.Co	AV	AV	AV
0340	I:A	FG:I	Preseparater,St.	Designed for Loadings > 1 gr/SCF, Inline		
1730	I:A	FG:I	Right Angle Pre.Co	Designed for Loadings > 1 gr/SCF, Right	Angle, SoRI/EPA design.	
3860	I:A	FG:I	Right Angle Pre.Co	Designed for Loadings > 1 gr/SCF, Right	Angle, SoRI/EPA design.	
3870	I:A	FG:I	BCURRA Cyc.			
4180	I:A	FG:I	Model 220 CP	Designed for Loadings > 1 gr/SCF, Right	Angle, SoRI/EPA design.	
0350	I:CI	AAA	Low Pressure Imp	0.1 SCFM (F,.08, .11, .23, .52, .9, 1.4,	2.0, 3.3, 6.6, 10.5, 15.7, 21.7, 35) Mfg	
0710	I:CI	AAA	C-2000 QCM Cascade	0.01SCFM (F,.07, .13, .22, .40, .63, 1.1	2.1, 4.3, 8.8, 18, 35) Mfg Quartz	Crystal Microbalance
0910	I:CI	AAA	PC-202 QCM	0.01SCFM (F,.05, .1, .2, .4, .8, 1.6,3.2,	6.4, 12.5, 25) Mfg Quartz	Crystal Microbalance
0920	I:CI	AAA	MPS-3	0.07SCFM (F,.05, .3, 2) Mfg		
0210	I:CI	FG:I	APT HTP Impactor	0.5 ACFM,1200F(F, .18, .28, .43, .61,.92,	1.2, 2.1, 3.1, 4.8, 7.2), Mfg Data	
0310	I:CI	FG:I	Mark III Impactor	0.5 SCFM (F, .42, .78, 1.2, 2.2, 4.3,	5.9, 9.3, 9.9) Ref.18	
0320	I:CI	FG:I	HCSS Impactor	0.5 SCFM (F, 1.5, 5.8, 11) SoRI Cyc #3,	Bulk Samples, Inlet Loadings	
1710	I:CI	FG:I	Mark 3	0.5 SCFM (F,.52, .90, 1.3, 2.2, 3.0, 4.3,	6.8, 10.2) Ref 18, Built in Preseperator	(10.2 um)
1720	I:CI	FG:I	Mark 4	0.5 SCFM (F,.52, .90, 1.3, 2.2, 3.0, 4.3,	6.8) Ref 18, same as Mark 3 except uses	right angle Preseperator, not built in
2910	I:CI	FG:I	Belfort 1502	0.5 SCFM (F,.52, .69, 1.1, 2.2, 4.8, 9.0,	9.0) Ref 18, stage 1 & 2 cut at 9.0	Metrology Res.Inc. was bought by Belfort
3810	I:CI	FG:I	Mark 3	0.5 SCFM (F,.30, .67, 1.6, 1.8, 4.4,10.1,	10.1) Ref 18, stage 1 & 2 cut at 10.1	Univ. of Washington design

Table A-5: Instrument Type Sorted: More Description

KEY No.	Inst. Type Code	Use Code	Vender/Model No.	Comments (1 of 3)	Comments continued (2 of 3)	Comments continued (3 of 3)
3820	I:CI	FG:I	Mark 5	0.5 SCFM (F,.21, .28, .36, .46, .62, .80	, 1.05, 1.5, 2.8, 5.6, 32) Mfg., U of W,	
3830	I:CI	FG:I	Mark 10	0.2 SCFM (F, DNA) Inlets, Low Flow,	High Loadings, custom order.	Stages interchangable with Mark 3
3840	I:CI	FG:I	Mark 20B	2.0 SCFM (F, DNA) Outlets,high Flow,	Low Loadings, custom order.	
3850	I:CI	FG:I	MARK 8	DNA SCFM (F, DNA) Inlets,HCSS type,	High Capacity Stack Sampler	
4110	I:CI	FG:I	Model 226	0.25SCFM (F,.9, 1.7, 2.5, 4.1, 11, 14)	Ref. 18	
4120	I:CI	FG:I	Model 228	0.25SCFM (F,.3, .5,.9, 1.7, 2.7, 4.4,11	, 18) Mfg. Data	
4130	I:CI	FG:I	Model 2210	0.1 SCFM (F,.09, .35, .57, .86, 1.5, 2.7	, 4.2, 6.9, 17, 28) Mfg Data	
4910	I:CI	FG:I	Brink Model C	.03 SCFM (F,.47,.78, 1.1, 2.3, 3.7, 5.4	, 9.2) Ref. 18, Low Flow, Inlets, High	Loading collection stages available.
0410	IAN	L:Oth	Image Analysis			
0610	IAN	L:Oth	Omnicon 3500			
1310	IAN	L:Oth	CCSEM (Test Lab)	Morphology, size, & elemental chem. of	each particle is stored on disk. Define	class and analy., redefine and reanaly.
2610	IAN	L:Oth	DA-10			
3120	IAN	L:Oth	Image Any. System			
3210	IAN	L:Oth	Magiscan 2			
3510	IAN	L:Oth	Image Any. System			
4510	IAN	L:Oth	Model 1A1000			
4610	IAN	L:Oth	Image Any. System			
4810	IAN	L:Oth	IBAS			
0620	MA	MA	EM-2	Morphology, size, & elemental chem. of	each particle is stored on disk. Define	class and analy., redefine and reanaly.
1220	MA	MA	Coulter AccuComp	Note: MCA acc. :Population Accessory II	(PCA II), 100 ch , selectable	
1540	MA	MA	FP-303 Opt.	Also includes clock and RS 232 C		
1550	MA	MA	KD-01 Diluter	May be used with any aerosol instrument	with comparable flow rate	
1920	MA	MA	Comp-sieve Anal.Sy			
2320	MA	MA	DCF Data An. Pkg.			
2330	MA	MA	Apple IIe Computer			
4445	MA	MA	IBM-XT(DR for APS)			
0360	MT17	MA	Emission Param. An	Mount Imp. or Cyc. to probe to complete	sampling train (Flow control,trav. etc.)	
0370	MT17	MA	Universal Stack Sp	Mount Imp. or Cyc. to probe to complete	sampling train (Flow control,trav. etc.)	
3410	MT17	MA	Nutech 2010	Mount Imp. or Cyc. to probe to complete	sampling train (Flow control,trav. etc.)	
3420	MT17	MA	Nutech 220-2	Mount Imp. or Cyc. to probe to complete	sampling train (Flow control,trav. etc.)	
4010	MT17	MA	RAC Stacksamplr	Mount Imp. or Cyc. to probe to complete	sampling train (Flow control,trav. etc.)	
1980	Misc	L:AR	Infrasizer,Gilson	Bulk powder seperation by Air Elutriation	of redispersed powder, (50->100 gm),F+ 6	cuts (x .707), Stokes Law
1110	O:A	AAA	Model 226	Remot, w/ 8040 Main Frame: (.3, .4, .6,	.8, 1, 1.5, 2, 3, 4, 5, 6, 7, 8, 9, 10)	
1130	O:A	AAA	Model 8060	Stand alone, replaces 208C,(.3, .5, .7,	1, 5, 10), RS 232C, alarms,temp.,	relitive humidity
1510	O:A	AAA	Status 2100	(.5, 5) 70 deg. side scatter	w/o printer	
1520	O:A	AAA	Status 4000	(.3, .5, 1, 2, 5), 70 deg. side scatter		
1530	O:A	AAA	Status 5000	(.3, .5, 1, 2, 5), 70 deg. side scatter		
2020	O:A	AAA	Model 4101 System	Model number is a Pkg. 4100 + sensor	Near forward scattering	
2030	O:A	AAA	Model 4102 System	Model number is a Pkg. 4100 + sensor	Near forward scattering	
2040	O:A	AAA	Model 4130 System	Model number is a Pkg. 4100 + sensor	Ellipsoidal Mirror 30->170 deg.	5mW HeNe laser
2050	O:A	AAA	Model 5100	(.25, .3, .5, 1, 5, 10) stand alone	Ellipsoidal Mirror 60->120 deg., right	angle, HeNe open cavity laser
2051	O:A	AAA	(cont)	Alarm, opt. Printer and transducer,	Facility Monitoring System	cont.
3720	O:A	AAA	LPC-101	(.1,.3, .5, 1)	printer, RS232C,	Laser Particle Counter
3730	O:A	AAA	LAS-250X-CRT	(.2, .3, .4, .5, .6, .8, 1, 1.2, 1.5, 2,	3, 4, 5, 6, 8, 10, 12), printer, RS232C,	Laser Aerosol Spectrometer
3910	O:A	AAA	HN-15 Karlsruhe	90 deg scattering, Halogen lamp, 64 ch	MCA option, basic unit for interface to	MCA, liquidborn opt., no pump-passive flow
3710	O:A	FG:I	FPSSS	4 Ranges,15 steps per range:(.4->1.15	by .05),(1.15->5.65 by .3), (.5->2 by.1)	(2->11 by .6), open sensor section.
2710	O:FD	AAA	2600D Spray D Any	(3 ranges, 16ch/range), Spray Droplet	Analyser, Acc. for liquidborn & dry power	feed, mirco. control, no pump-passive flow
2510	O:FD	FG:I	Stack Part. Monit.	(.3, 1, 3.5, 7.5, 15), Fiber optics,	dual optics system, PROTOTYPE ONLY	

KEY No.	Inst. Type Code	Use Code	Vender/Model No.	Comments (1 of 3)	Comments continued (2 of 3)	Comments continued (3 of 3)
4310	O:FD	FG:I	Particle Sizing In	Argone Lab., Dual Optics (ratio & Interferometry), PROTOTYPE, 1978 Denver EPA		conf. Transfer and Utilization of ...
2410	O:FD	L:LS	Microtrac 7995-10	(.7->125 by x1.414 steps)		
2420	O:FD	L:LS	7995-30Small Part.	(.12, .17, .24, .34 by 2nd optics sys.;	F Diff.:.43->42.2 by x1.414 steps)	
2730	O:FD	L:LS	Model 3600E	Same as 2600D but dsigned for liquid	CR	CR
2810	O:FD	L:LS	Granulometer	(1, 1.5, 2, 3, 4, 6, 8, 12, 16, 24),	DR computer opt. available (software,	hardware, plotter etc.)
4260	O:FD	L:LS	ILI 1000	16 ch MCA by Acc. PPA-4, multiangle	scattering, bottled samples	
4710	O:FD	L:LS	Dawn Model B	Laser, multi angle scattering, Acc.:	Columbia MPC (PHA & DR)	
1940	O:L	L:LS	Laser Particle Cou	(see Major Acc.: SAA-3 for 16 ch MCA)		
2060	O:L	L:LS	Model 4103 System	Model number is a Pkg. 4100 + sensor	Light obscuration sensor	
2070	O:L	L:LS	Model 4113 System	Model number is a Pkg. 4100 + sensor		
2085	O:LB	L:LS	HIAC 4313 System	Model number is a Pkg. 4300 + sensor		
0810	O:PC	L:LS	BI-90	fitted curves, unimodal		
1230	O:PC	L:LS	N4-128/MD	5 ranges (13 div/range) .04->.15,	.10->.30, .20->.60, .40->1.2, .80->3.0	
2090	O:PC	L:LS	NICOMP Model 270	(Fitted curves , multimodal, includes	DR computer/printer	
2720	O:PC	L:LS	Autosizer II	32 pt fitted curve		
1010	PHA	MA	MCA Series 35+			
1120	PHA	MA	Model 8040	Multiplex 40 ext. sensor (particles,	temp, humidity). Main Frame includes 24	ch MCA, printer/plotter, DR, RS232C,etc.
1950	PHA	MA	Particle Profile	(1, 5, 10, -> 75 by 5 um steps)		
2010	PHA	MA	Model 4100	Multiplex ext. sensors (particles,	temp, humidity). Main Frame includes 6	ch MCA, printer/plotter, DR, RS232C,etc.
2080	PHA	MA	HIAC 4300	Multiplex ext. sensors (particles,	temp, humidity). Main Frame includes 32	ch MCA, printer/plotter, DR, RS232C,etc.
3310	PHA	MA	ND 62 MCA			
4270	PHA	MA	PPA-4	w/ILI 1000: (1-> 17 in 1 um steps)	or (15-> 100 in 5 um steps), Includes	Apple w/ printer, software, etc.
4720	PHA	MA	Columbia MPC			
1210	RP	L:LS	TA II L/3 Plus	Select orifice, 16 ch for this orifice	(2% to 50% of orifice diameter)	
3610	RP	L:LS	180LSD/ADC-80XY/KP	Select orifice, 124 ch for this orifice	(2% to 50% of orifice diameter),includes	computer/printer for data storage & anal
0510	SIV	L:Oth	L3P Sonic Sifter			
1910	SIV	L:Oth	Gilson Sieve Shaker			
1930	SIV	L:Oth	ATM sonic Sifter	AV	AV	AV

Table A-6: Instrument Type Sorted: Specifications

KEY No.	Inst. Type Code	Use Code	Vender/Model No.	Size Resolution: #of Size Cuts	UF 0->.3	FINE .3->3	MED 3->10	COARSE >10	Dia. Basis A,P,O	Concentration Information: Mass Basis (mg/M3) min.	Mass Basis MAX.	Number Basis (#/cm3) min.	Number Basis MAX.	Sampling Rate (SCFM) min.	Sampling Rate Max.	Nominal Flow Rate (SCFM)	Nozzle Sizes(in.) Available min	Nozzle Max	min Port Req. (in.)	Max. Oper. Temp. Deg F	Weight (lb)	Power (amp)
4440	AT	AAA	APS 33 Sy	47	0	25	16	6	0		N/A	DNA	6E3	.04	.04	.04	N/A	N/A	N/A	Amb	DNA	10
1975	CET	AV	Bahco Classifier	AV	AV	AV	AV	AV	AV	AV	AV	AV	AV	AV	AV	AV	AV	AV	AV	AV	AV	AV
1610	CET	L:AR	BAHCO Classifier	8	0	1	2	5	A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Amb	140	14
1410	CNC	AAA	Rich 200 CNC	NONE					N/A		N/A	50	1E6	.06	.15	.1	N/A	N/A	N/A	Amb	35	2
1810	CNC	AAA	CNC-2	NONE					N/A		N/A	10	1E6	.2	.2	.2	N/A	N/A	N/A	Amb	67	4
4450	CNC	AAA	CNC 3020	NONE	4	5	1	0	N/A		N/A	.01	1E7	.01	.01	.01	N/A	N/A	N/A	Amb	30	2
1960	CSED	L:LS	Fritsch Pipette CF	10	4	5	1	0	Other	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Amb	100	~10
1985	CSED	L:LS	Photo Micron Sizer	DNA					Other	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Amb	200	~10
2110	CSED	L:LS	CAPA-500 Spirom.	DNA					Other	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Amb	110	~10
2310	CSED	L:LS	Disk Centrifuge 4	DNA					Other	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Amb	66	~10
0110	CYC	FG:E	SASS	3	0	1	1	1	A		High	N/A	N/A	4	4	4	1/8	1/2	3	1000	200(4)	40
1740	CYC	FG:I	6-Stage Cyclone	AV	AV	AV	AV	AV	AV	AV	AV	AV	AV	AV	AV	AV	AV	AV	AV	AV	AV	AV
1750	CYC	FG:I	4-Stage Cyclone	AV	AV	AV	AV	AV	AV	AV	AV	AV	AV	AV	AV	AV	AV	AV	AV	AV	AV	AV
1760	CYC	FG:I	3-Stage Cyclone	2	0	1	1	0	A		High	N/A	N/A	.2	1.25	1.0	1/8	1/2	4	820	4	15
2210	CYC	FG:I	5-Series Cyclone	AV	AV	AV	AV	AV	AV	AV	AV	AV	AV	AV	AV	AV	AV	AV	AV	AV	AV	AV
4140	CYC	FG:I	Cyclade 285-K	5	0	3	2	0	A		High	N/A	N/A	.2	1.25	1.0	1/8	1/2	4	820	7	15
4150	CYC	FG:I	Cyclade 286-1K	6	0	3	2	1	A		High	N/A	N/A	.8	.8	.8	1/8	1/2	5	820	9	15
4160	CYC	FG:I	Cyclade 286-2K	6	0	2	2	2	A		High	N/A	N/A	.5	.5	.5	1/8	1/2	4	820	8	15
4170	CYC	FG:I	Cyclade 283-2K	3	0	2	1	0	A		High	N/A	N/A	.2	1.25	1.0	1/8	1/2	4	820	5	15
1970	CYC	L:LS	Cyclosizer Analyzr	5	0	0	0	5	Other	LAB	LAB	LAB	LAB	.3	.5	.5	LAB	LAB	N/A	Amb	800	~ 5
1420	DB	AAA	Diffusion Denuder	Many	Many	0	0	0	Other		N/A	N/A	N/A	.06	.15	.1	N/A	N/A	N/A	Amb	8	N/A
2221	DB	AAA	DB 02-1900	10	10	0	0	0	Other		N/A	N/A	N/A			.4	N/A	N/A	N/A	Amb	10	N/A
4420	DB	AAA	DB/CNC 3931 Sy	10	10	0	0	0	Other		N/A	.01	1E7	.04	.18	.14	N/A	N/A	N/A	Amb	100(3)	5
4460	DB	AAA	DB 3040	10	10	0	0	0	Other		N/A	N/A	N/A	.04	.18	.14	N/A	N/A	N/A	Amb	10	N/A
4210	DIL	MA	SEDS	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	.5	.5	.5	N/A	N/A	2	700	1000(4)	40
4470	DIL	MA	Diluter 3302	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	.18	.18	.18	N/A	N/A	N/A	Amb	20	10
4405	EM	AAA	EAA 3030	CR	CR	CR	CR	CR	CR	CR	CR	CR	CR	CR	CR	CR	CR	CR	CR	Amb	100(2)	10
4410	EM	AAA	EAA 3930 Sy	10	8	2	0	0	Other		N/A	2E3	5E7	.14	.14	.14	N/A	N/A	N/A	Amb	200(4)	10
4430	EM	AAA	DMPS/C 3932 Sy	32	22	9	1	0	Other		N/A	.01	1E7	.14	.14	.14	N/A	N/A	N/A	Amb	200(4)	10
1990	GSED	L:LS	Andreasen S. Pipet	many	0	1	(manual)		Other	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Amb	1	0
3010	GSED	L:LS	Sedigraph 5000ET	21	1	8	7	5	Other	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Amb	150	20
0330	I:A	AV	Right Angle Pre.Co	AV	AV	AV	AV	AV	AV	AV	AV	AV	AV	AV	AV	AV	AV	AV	AV	AV	AV	AV
0340	I:A	FG:I	Preseparater,St.	1	0	0	0	1	AV		High	N/A	N/A	.1	.75	.5	1/8	1/2	3	820	1	N/A
1730	I:A	FG:I	Right Angle Pre.Co	1	0	0	0	1	A		High	N/A	N/A	.1	.45	.5	1/8	1/2	4	1500	1	N/A
3860	I:A	FG:I	Right Angle Pre.Co	1	0	0	0	1	A		High	N/A	N/A	.1	1.2	.5	3/16	1/2	3	820	1	N/A
3870	I:A	FG:I	BCURRA Cyc.	1	0	0	1	0	A		High	N/A	N/A	.1	1.2	.5	1/8	3/8	4	820	1	N/A
4180	I:A	FG:I	Model 220 CP	1				1	A		High	N/A	N/A	.04	.35	.25	3/32	1/2	3	820	1	N/A
0350	I:CI	AAA	Low Pressure Imp	13	3	4	2	4	A	DNA	DNA	N/A	N/A	.1	.1	.1	N/A	N/A	N/A	Amb	15	<5
0710	I:CI	AAA	C-2000 QCM Cascade	15	3	4	2	2	A	.005	100	N/A	N/A	.01	.01	.01	N/A	N/A	N/A	Amb	15	<5
0910	I:CI	AAA	PC-202 QCM	10	3	3	2	2	A	.001	1000	N/A	N/A	.01	.01	.01	N/A	N/A	N/A	Amb	34	10
0920	I:CI	AAA	MPS-3	3	1	2	0	0	A	DNA	DNA	N/A	N/A	.07	.07	.07	N/A	N/A	N/A	Amb	7	10
0210	I:CI	FG:I	APT HTP Impactor	6(11)	2	5	4	0	A		DNA	N/A	N/A	.05	.5	.5	1/8	1/2	4	1000	10	15
0310	I:CI	FG:I	Mark III Impactor	8	0	4	3	1	A		DNA	N/A	N/A	.1	.75	.5	1/8	1/2	3	820	10	15
0320	I:CI	FG:I	HCSS Impactor	3	0	0	2	1	A		High	N/A	N/A	.2	.75	.5	1/8	1/2	3	1500	10	15

KEY No.	Inst. Type Code	Use Code	Vender/Model No.	Size Resolution: #of Size Cuts	UF 0->.3	FINE .3->3	MED 3->10	COARSE >10	Dia. Basis A,P,O	Concentration Information: Mass Basis (mg/M3) min.	Mass Basis MAX.	Number Basis (#/cm3) min.	Number Basis MAX.	Sampling Rate (SCFM) min.	Sampling Rate Max.	Nominal Flow Rate (SCFM)	Nozzle Sizes(in.) Available min	Nozzle Max	min Port Req. (in.)	Max Oper. Temp. Deg F	Weight (lb)	Power (amp)
1710	I:CI	FG:I	Mark 3	8	0	5	2	1	A		?	N/A	N/A	.1	.75	.5	1/8	1/2	3	820	5	15
1720	I:CI	FG:I	Mark 4	7	0	5	2	0			?	N/A	N/A	.1	.75	.5	1/8	1/2			5	15
2910	I:CI	FG:I	Belfort 1502	7	0	4	3		A	DNA	DNA	N/A	N/A	?	1.0	.5	1/8	1/2	3	450	3.5	15
3810	I:CI	FG:I	Mark 3	7	1	3	1	2	A	DNA	DNA	N/A	N/A	.02	1.2	.5	3/16	1/2	3	450	9	15
3820	I:CI	FG:I	Mark 5	11(13)	2	8	2	1	A	DNA	DNA	N/A	N/A	.02	1.0	.5	3/16	1/2	3	450	15	15
3830	I:CI	FG:I	Mark 10	27	DNA	DNA	DNA	DNA	A		?	N/A	N/A	.1	.2	.2	1/8	1/4	4	450	<50	20
3840	I:CI	FG:I	Mark 20B	14	DNA	DNA	DNA	DNA	A		?	N/A	N/A	?	?	2.0	?	?	4	450	<50	20
3850	I:CI	FG:I	MARK 8	DNA	DNA	DNA	DNA	DNA	A	DNA	DNA	N/A	N/A						3	450	<15	15
4110	I:CI	FG:I	Model 226	6	0	3	1	2	A	DNA	DNA	N/A	N/A	.04	.35	.25	3/32	1/2	3	820	4	15
4120	I:CI	FG:I	Model 228	8		5	1	2	A	DNA	DNA	N/A	N/A	.04	.35	.25	3/32	1/2	3	820	4.5	15
4130	I:CI	FG:I	Model 2210	10	1	5	2	2	A	DNA	DNA	N/A	N/A	.04	.35	.25	3/32	1/2	3	820	5	15
4910	I:CI	FG:I	Brink Model C	8	0	4	3	0	A	DNA	DNA	N/A	N/A	.02	.05	.03	3/32	1/2	3	820	10	10
0410	IAN	L:Oth	Image Analysis	Many	N/A	N/A	N/A	N/A	Other	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Amb	Heavy	High
0610	IAN	L:Oth	Omnicon 3500	Many	N/A	N/A	N/A	N/A	Other	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Amb	Heavy	High
1310	IAN	L:Oth	CCSEM (Test Lab)	Many	N/A	N/A	N/A	N/A	Other	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2610	IAN	L:Oth	DA-10	Many	N/A	N/A	N/A	N/A	Other	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Amb	Heavy	High
3120	IAN	L:Oth	Image Any. System	Many	N/A	N/A	N/A	N/A	Other	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Amb	Heavy	High
3210	IAN	L:Oth	Magiscan 2	Many	N/A	N/A	N/A	N/A	Other	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Amb	Heavy	High
3510	IAN	L:Oth	Image Any. System	Many	N/A	N/A	N/A	N/A	Other	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Amb	Heavy	High
4510	IAN	L:Oth	Model 1A1000	Many	N/A	N/A	N/A	N/A	Other	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Amb	Heavy	High
4610	IAN	L:Oth	Image Any. System	Many	N/A	N/A	N/A	N/A	Other	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Amb	Heavy	High
4810	IAN	L:Oth	IBAS	Many	N/A	N/A	N/A	N/A	Other	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Amb	Heavy	High
0620	MA	MA	EM-2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Amb	Heavy	High
1220	MA	MA	Coulter AccuComp	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Amb	20	<5
1540	MA	MA	FP-303 Opt.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Amb	10	<5
1550	MA	MA	KD-01 Diluter	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Amb	5	0
1920	MA	MA	Comp-sieve Anal.Sy	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Amb	20(3)	<5
2320	MA	MA	DCF Data An. Pkg.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Amb		<5
2330	MA	MA	Apple IIe Comp.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Amb		<5
4445	MA	MA	IBM-XT(DR for APS)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Amb	40	<5
0360	MT17	MA	Emission Param. An	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	.3	1.5	.75	N/A	N/A	3	820	100	N/A
0370	MT17	MA	Universal Stack Sp	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	.3	1.5	.75	N/A	N/A	3	820	100	N/A
3410	MT17	MA	Nutech 2010	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	.3	1.5	.75	N/A	N/A	3	820	100	N/A
3420	MT17	MA	Nutech 220-2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	.01	.08	.04	N/A	N/A	N/A	820		N/A
4010	MT17	MA	RAC Stacksamplr	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	.3	1.5	.75	N/A	N/A	3	820	100	N/A
1980	Misc	L:AR	Infrasizer,Gilson	6	0	0	0	6	Other	N/A	N/A	N/A	N/A	N/A	N/A		N/A	N/A	N/A	Amb	200	<5
1110	O:A	AAA	Model 226	16	0	8	7	1	0	N/A	N/A	DNA	DNA	.25	1	.25	N/A	N/A	N/A	Amb	45	<5
1130	O:A	AAA	Model 8060	6	0	4	1	1	0	N/A	N/A	DNA	DNA	1	1	1	N/A	N/A	N/A	Amb	46	<5
1510	O:A	AAA	Status 2100	2	0	1	1	0	0	N/A	N/A	DNA	9E5	.01	.01	.01	N/A	N/A	N/A	Amb	16	<5
1520	O:A	AAA	Status 4000	5	1	3	1	0	0	N/A	N/A	DNA	1.5E4	1	1	1	N/A	N/A	N/A	Amb	55	<5
1530	O:A	AAA	Status 5000	5	1	3	1	0	0	N/A	N/A	DNA	2.8E6	.02	.02	.02	N/A	N/A	N/A	Amb	24	<5
2020	O:A	AAA	Model 4101 System	6	selectable				0	N/A	N/A	DNA	3E6	1	1	1	N/A	N/A	N/A	Amb	64	<5
2030	O:A	AAA	Model 4102 System	6	selectable				0	N/A	N/A	DNA	1E8	.01	.1	.1	N/A	N/A	N/A	Amb	64	<5
2040	O:A	AAA	Model 4130 System	6	selectable				0	N/A	N/A	DNA	1E6	1	1	1	N/A	N/A	N/A	Amb	71	<5
2050	O:A	AAA	Model 5100	6	2	2	2	0	0	N/A	N/A	DNA	DNA	1	1	1	N/A	N/A	N/A	Amb	50	<5

Table A-6: Instrument Type Sorted: Specifications

KEY No.	Inst. Type Code	Use Code	Vender/Model No.	Size Resolution: #of Size Cuts	Size Resolution: UF 0->.3	Size Resolution: FINE .3->3	Size Resolution: MED 3->10	Size Resolution: COARSE >10	Dia. Basis A,P,O	Concentration Information: Mass Basis (mg/M3) min.	Concentration Information: Mass Basis (mg/M3) MAX.	Concentration Information: Number Basis (#/cm3) min.	Concentration Information: Number Basis (#/cm3) MAX.	Sampling Rate (SCFM) min.	Sampling Rate (SCFM) Max.	Nominal Flow Rate (SCFM)	Nozzle Sizes (in.) Available min	Nozzle Sizes (in.) Available Max	min Port Req. (in.)	Max Oper. Temp. Deg F	Weight (lb)	Power (amp)
2051	O:A	AAA	(cont)	cont.	cont.	cont.	cont.	cont.	cont.	cont.	cont.	cont.	cont.	cont.	cont.	cont.	cont.	cont.	cont.	cont.	cont.	cont.
3720	O:A	AAA	LPC-101	4	1	2	1	0	0	N/A	N/A	10	1.4E7	.1	.1	.1	N/A	N/A	N/A	Amb	45	<5
3730	O:A	AAA	LAS-250X-CRT	16	2	8	5	2	0	N/A	N/A	100	1.4E7	.1	.1	.1	N/A	N/A	N/A	Amb	60	<5
3910	O:A	AAA	HN-15 Karlsruhe	64		selectable			0	N/A	N/A	DNA	1E5	N/A	N/A		N/A	N/A	N/A	Amb	60	<5
3710	O:A	FG:I	FPSSS	4X15	0	15+15	15+14	2	0	?	N/A	DNA	5E4	N/A	N/A	N/A	N/A	N/A	4	480	150(3)	10
2710	O:FD	AAA	2600D Spray D Any	16		selectable			0	N/A	N/A	DNA	DNA	N/A	N/A	N/A	N/A	N/A	N/A	Amb	70	<5
2510	O:FD	FG:I	Stack Part. Monit.	5	1	1	2	1	0	10	1000	N/A		N/A	N/A	N/A	N/A	N/A	4	500	154(3)	20
4310	O:FD	FG:I	Particle Sizing In	DNA					0	N/A	N/A	DNA	1.0E7	N/A	N/A	N/A	N/A	N/A	N/A	Amb		<5
2410	O:FD	L:LS	Microtrac 7995-10	13	0	5	3	8	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Amb	103(3)	5
2420	O:FD	L:LS	7995-30Small Part.	16	3	6	3	5	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Amb	103(3)	5
2730	O:FD	L:LS	Model 3600E	CR	CR	CR	CR	CR	CR	CR	CR	CR	CR	CR	CR	CR	CR	CR	CR	CR	CR	CR
2810	O:FD	L:LS	Granulometer	16	0	4	3	9	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Amb	127	<5
4260	O:FD	L:LS	ILI 1000	16	0	3	7	7	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Amb	31	<5
4710	O:FD	L:LS	Dawn Model B	16		selectable			0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Amb	45	<5
1940	O:L	L:LS	Laser Particle Cou	1		selectable			0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Amb	50	<5
2060	O:L	L:LS	Model 4103 System	6		selectable			0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Amb	<70	<5
2070	O:L	L:LS	Model 4113 System	6		selectable			0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Amb	<70	<5
2085	O:LB	L:LS	HIAC 4313 System	32		selectable			0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Amb		<5
0810	O:PC	L:LS	BI-90	Fitted			0	0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Amb	75	<5
1230	O:PC	L:LS	N4-128/MD	65		selectable			0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Amb	70	<5
2090	O:PC	L:LS	NICOMP Model 270	64	many	many	0	0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Amb	165	<5
2720	O:PC	L:LS	Autosizer II	32	many	many	0	0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Amb	70	<5
1010	PHA	MA	MCA Series 35+	4096		selectable			N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Amb		<5
1120	PHA	MA	Model 8040	24		selectable			N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Amb	40	<5
1950	PHA	MA	Particle Profile	16	0	1	2	13	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Amb	35	<5
2010	PHA	MA	Model 4100	6		selectable			N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Amb	26	<5
2080	PHA	MA	HIAC 4300	32		selectable			N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Amb	73	<5
3310	PHA	MA	ND 62 MCA	4096		selectable			N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Amb		<5
4270	PHA	MA	PPA-4	DNA					N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Amb	40	<20
4720	PHA	MA	Columbia MPC	DNA					N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Amb	40	<5
1210	RP	L:LS	TA II L/3 Plus	16		selectable			Other	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Amb	100	<5
3610	RP	L:LS	180LSD/ADC-80XY/KP	124		selectable			Other	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Amb	100	<5
0510	SIV	L:Oth	L3P Sonic Sifter	5	0	0	0	5	Other	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Amb	60	<5
1910	SIV	L:Oth	Gilson Sieve Shakr	8	0	0	0	8	Other	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Amb	100	<5
1930	SIV	L:Oth	ATM Sonic Sifter	AV	AV	AV	AV	AV	AV	AV	AV	AV	AV	AV	AV	AV	AV	AV	AV	AV	AV	AV